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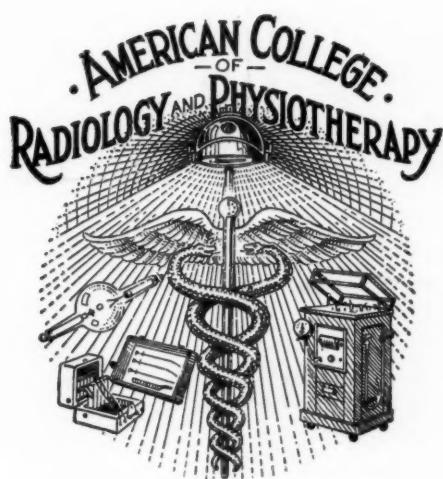
Vol. V

AUGUST, 1924

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Entered as Second Class Matter at the Post Office at Omaha, Nebraska,
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The JOURNAL OF RADIOLOGY

Omaha, Nebraska

Vol V

AUGUST. 1924

No. 8

Symptoms of Colonic Disturbances*

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THE colon, like its anatomical position in the body, takes so central a place in pathology that there are times when the physician and the patient feel that all the diseases of the body arise from it. In infants the pediatrician spends his time regulating the disorders of the large intestine. In middle life men and women in this day and age are busy keeping down the size of the large intestine and its container, the abdomen. In old age the large intestine for the first time has reached its state of true physiological equilibrium, and then life is too short to enjoy it. Lane, like Metchnikoff, felt that the colon was rather a detriment to the body than a help, the former removing it on numerous occasions, the latter making every effort to sweeten up its contents. Instead of "being as old as one's arteries," the blame for age was placed on the large gut. The conservation of colon function seems to have been the less radical and at the same time more successful of the two procedures.

Hewlett¹ divides the colon into two divisions:—first, the cecum to the middle of the transcolon; second, the transcolon to upper sigmoid. The first division has a reverse peristalsis for mixing its contents. It is in this section of the colon that the cellulose is generally broken up by large masses of bacteria, and if there is stasis here, most of the water is lost. The second division has a slow peristalsis, every three to five minutes,

and a rapid peristalsis three times a day, one of which, accompanied by increased intra-abdominal pressure and relaxation of sphincters, results in a bowel movement.

Given an individual with abdominal discomfort, the explanation of its etiology will depend upon the first specialist he happens to consult. Neurosis, focal infection, ptomaine poisoning, pulmonary or cardiac congestion, enteroptosis, appendicitis, pelvic disturbances, mucous colitis, constipation, proctitis, etc., are common in the nomenclature of colonic disturbances. Why does this occur? Is it because sufficient pains are not taken to discover the true cause of the discomfort? Not at all. It is because all of us know that health and comfort often result from the correction of the defect in our particular line; therefore, we are prone to reason that where the effect is dissipated, there the cause must have been remedied. The diagnosis of colonic disease is difficult and the internist, although untrammelled by the distraction of surgical technique, etc., many times must lean hard upon therapeutic results to arrive at even a speculative mood as to the real condition.

The causes of disturbances in the large intestine roughly fall into four groups:

1. Abnormal anatomy
2. Physiological unbalance
3. Infections
4. Extraperitoneal conditions

The results of these disturbances are limited only by the vocabulary of the patient who undergoes them. The physician must needs sort over these symptoms carefully if he is to

think clearly in an etiological way. Some of these symptoms that the patients complain of are as follows:

Abdominal discomfort	Pallor
Soreness	Nausea
Flatulence	Dragging pain
Distension	Dyspnea
Colic	Left side (subcostal) pain
Aching	Fatigue
Backache	Malaise
Sticking	Lack of "pep"
Unrest	Weakness
"All in" feeling	Anorexia
"Thumping" in abdomen	Headache
"Throbbing" in abdomen	Insomnia
Gurgling	Introspection
Tenesmus	Fever
Loss of weight	Chills
Anemia	Sweats
	Tightness
	Palpitation

They may all be included under the following: Pain, tenderness, flatulence, diarrhoea, constipation, malaise, malnutrition.

Flatulence, which is the "bete noir" for many of us in our daily work, must be caused by one or more of the following:

Interference with gastro-intestinal current.

Interference with starch digestion.

Interference with intestinal absorption.

Interference with intestinal circulation.

Air swallowing, etc.

When one comes to investigate further, it soon appears that it resolves itself down to a complete survey of the body systems in an effort to locate the offending part. Cardiac compensation is notorious for the flatulence it produces. This is due

*Read at a meeting of the Elkhorn Valley Medical Society, Fremont, Nebraska, Feb. 14, 1924.

SYMPTOMS OF COLONIC DISTURBANCES—HEAGEY

to the failure of the circulation to remove the gas to the lungs for disposal. On the other hand, reflex disturbances, gall-bladder, appendix, foods, infections, all play a prominent part in the production of flatulence.

Blood in the stools, when noted by the patient, is always accompanied by a demand for action; yet more blood is lost in an occult manner than is often realized. In carcinoma of the intestine the flow is steady and in the presence of ulceration is accompanied by pus. Bleeding from gastric ulcer is usually intermittent. Cabot² briefly outlines the causes of blood in the stool in his series of cases.

Hemorrhoids	2290
Colitis	
Ulcerative colitis	
Proctitis	518
Dysentery	
Carcinoma rectum	475
Gastric ulcer	370
Typhoid	332
Carcinoma stomach	209
Carcinoma sigmoid	117
Cirrhosis	53
Bilharziasis	4

With such a working model for the rest of the symptoms, we have several methods of precision for ferreting out the causes of any or all of these symptoms.

The palpation of the abdomen.

The examination of the stool, grossly, microscopically, chemically, repeatedly.

Rectal and sigmoidoscopic examination.

The x-ray, with opaque meal and barium enema.

The results of treatment.

These procedures should give one the location and the character of the

lesion. The rest of the problem is solved by simple classification:

1. Abnormal anatomy: (a) Disturbances of position—enteroptosis, internal and external hernia, volvulus, intussusception, transposition; (b) Size—megacolon, reduplication, and Hirschsprung's disease, stenosis.

2. Physiological unbalance: Disturbances of function—spastic and atonic constipation, mucous colitis.

3. Local: (a) Infections—such as colitis, acute and chronic; ulcerative, tuberculous, luetic; (b) Diverticulitis, either acquired or congenital in type.

4. Remote infections—pneumonia, malaria, etc.

5. Extra-peritoneal conditions: (a) Endocrine unbalance, thyroid, etc.; (b) Intestinal neuroses, which should include reflex disturbances from adjacent structures, such as the pelvis, appendix, gall bladder, kidney, lungs and heart.

Enteroptosis and adhesions give us the best examples of what a multitude of symptoms these two names may cover. Once the x-ray has discovered for us the stomach, cecum and transcolon near the pelvic brim, we are willing to call it a day's work and advise some sort of a "plexy." Nervousness, dragging pain with constipation, gas and anorexia are found in the majority of the cases, but ninety per cent of the cases with a marked sagging of the colon have no symptoms. In others it is a question whether the gut, the endocrine system, or central nervous system is the offender. Belts, corsets and an anticonstipation regime do good in all cases. The case for postoperative adhesions is just as clear from

the internist's point of view. Attention to the bowels relieves many a colic and a "kink" where the patient refuses further surgery.

Disturbance of function is shown by hyperperistalsis, spasm, atony or one or all these with mucus. The palpating hand on the abdomen usually notes several things—tender, distended cecum, which gurgles. As the cecum is palpated the patient complains of pain in the epigastrium or the left side. Tenderness may be traced along the transcolon, to be lost in the left subcostal region, and picked up again in the left lower quadrant. The sigmoid may be felt as a cylindrical mass which rolls under the hand, and which usually causes the patient to wince. The calibre of the stools is reduced, or they are dry and hard. The patient often has a bowel movement every day, but under treatment comes back remarking upon the size of the stool and movement compared to the previous ones, with attendant relief. Just where we step over into mucous colitis is hard to decide. Bastedo³ says mucous colitis is constipation plus mucus, lack of energy, nervousness and abdominal distress. It is a vicious circle, for the worse the colitis the worse the general condition, and once this condition is reversed the patient begins to recover.

Infections bring us to a field that seems to have no limit, either in etiology, diagnosis or treatment. Colitis may be found in all degrees; from the hyperemia and edema of mucous membrane to the thickened intestinal wall, with no mucous membrane and deep ulceration, scar tissue and stenosis. Here the examination of the stool is paramount. The pres-

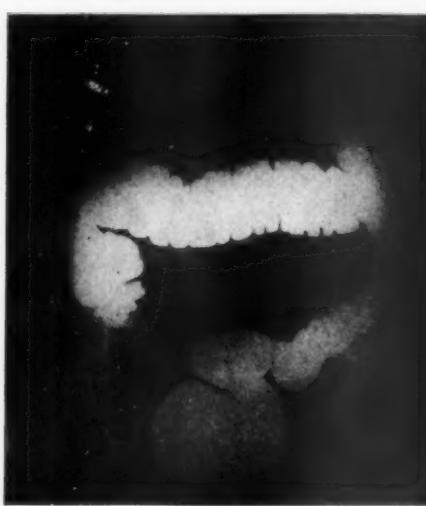


Fig. 1—Roentgenogram of the normal colon. Notice haustration from cecum to sigmoid.
Fig. 2—Roentgenogram of spastic descending colon. Notice irregular haustration.



Fig. 3—Roentgenogram of a mucous string impregnated with barium in descending colon. On the original film one can also see the contracted colon around the mucous string.

SYMPTOMS OF COLONIC DISTURBANCES—HEAGEY

ence of amebae, etc., make the problem easy. The etiology in the majority of cases lies outside the large gut, and in the acute stages we are prone to overlook the colitis in the stress of symptoms more urgent—arthritis, erythematous nodules, ptegae—in fact, all the symptoms of an acute rheumatic fever or focal infection. With the subsidence of the general symptoms the patient resumes his daily occupation, bothered only (!) by three to fifteen stools a day. The average case of chronic ulcerative colitis in its early stages has little pain, some gas, no fever, and as a rule is most optimistic. When the condition has reached this stage, all statistics are against him.

Although the condition is fraught with dire possibilities, such as peritonitis, sigmoiditis, stenosis, cancer, perforations into the bladder, etc., according to Dunn and Woolley,⁵ yet it seems to be the general consensus of opinion that a most strenuous medical regime should be insisted upon during a period of "watchful waiting." Two cases recently, which offered only a bad risk from a surgical standpoint, have responded nicely, so that a partial intestinal obstruction was overcome in one; in the other, twice in three months a large tender mass slowly subsided after the medical man asked for twenty-four hours leeway before the abdomen was opened. The diagnosis is completed

by the x-ray. The cloud in the sky is cancer. Thirteen of forty-two cases of Mayo had it, none of Dunn's six cases. I have seen four operated upon in St. Luke's Hospital, New York City, for carcinoma of the sigmoid, which were only diverticulitis. The last three cases seen clinically are still alive and well.

Carcinoma patients usually lose weight early, have tenderness and pain late, and the tumor or signs of obstruction are the first symptoms.

Tuberculous colitis is much more uncommon than is usually believed. Many cases of diarrhea in cases of pulmonary tuberculosis, are the achylia, or ordinary acute infections if one can judge from the results of



Fig. 4—Roentgenogram showing a single diverticulum in the left of the transverse colon. This shows as an outreaching of the lumen.



Fig. 5—Roentgenogram of left sided cecum and appendix—a developmental anomaly.



Fig. 6—Roentgenogram of redundant sigmoid extending up to transverse colon—a developmental anomaly.



Fig. 7—Roentgenogram of carcinoma of the rectum. Notice the irregular narrowing of the lumen. Compare with Figure 6.

therapeusis in sanitarium work. Lues is extremely vague as a cause of colonic disturbances.

Aside from the above disturbances, there is one large group in which the colon is affected by causes outside of it, such as infections of the gall bladder, the appendix, the kidneys, or the pelvic viscera. Cardiac or pulmonary pathology forms no small part in this group of outside causes. Many of us have seen cases of so-called mucous colitis disappear with a cholecystectomy; indigestion and gas and constipation with the removal of an appendix; abdominal discomfort with righting of pelvic pathology. The more remote causes, such as the chronic infections of the body—central nervous system lesions, fatigue, worry, excitement, thyroid, fear—afford much room for speculation. The term "intestinal neurosis", used to cover a great number of these cases, serves as a catch-

SYMPTOMS OF COLONIC DISTURBANCES—HEAGEY

all to save our own minds while one looks for the true cause. The habit of treating the colon has not been devoid of results, because as I said before, any improvement of the body's general condition often results in amelioration of the body ills in general.

Therefore, if we remember with Wilson⁶, that functional disturbances of the colon cause abdominal pain, and that sensations of the colon may distress and destroy a sense of well-

being, we may be able by attention to a badly acting colon to save our patient a great deal of discomfort and trouble.

BIBLIOGRAPHY.

1. Hewlett, A. B.: *Pathological Physiology of Internal Diseases*, p. 190. Appleton, 1923.
2. Cabot, R.: *Differential Diagnosis* I, p. 407. W. B. Saunders, 1914.
3. Bastedo, W. A.: The Treatment of Mucous Colitis. *Jour. A. M. A.* 74:240, 1920.
4. Logan, A. H.: Chronic Ulcerative Colitis; A Review of 117 Cases. *Mayo Papers*, p. 180, 1918.
5. Dunn, A. D., and Woolley, Paul H.: Acquired Diverticulitis of the Sigmoid, with a Report of Six Cases. *Am. Jour. Med. Sci.* 142:15, July, 1911.
6. Wilson, T. S.: *Jour. A. M. A.* Abstract 79:409, 1922. Original in *Brit. M. J.*, p. 944. June 17, 1922.

A New Method for Roentgen Examination of the Duodenum*

NANDOR RATKOCZI, M. D.

Leader of the Roentgen Laboratory of the III Medical Clinic. Professor Baron Koranyi,
Royal University, Budapest, Hungary.

DISCUSSIONS over a period of many years have not yet decided the relative value of roentgenography and roentgenoscopy in the diagnosis of duodenal affections. The Vienna school claims the sole right of roentgenoscopy, the Stockholm school wishes to unite both methods, but leans more to roentgenography. The Americans and Germans couch a chance for serial roentgenography, chiefly because they cannot observe the fine details, for instance the small ulcer recess, on the screen.

The method of examination described here creates such possibilities of observation on the screen, that one may see the "cap" with all its details and may distinguish not only its rude spastic and organic variations, but the smallest ulcer-recesses, to the size of a small lentil.

The direction of the rays is almost extro-sinistral. The patient, standing behind the screen, ingests the thin barium meal under the control of the observer. While he is consuming the first half of the meal, I observe the lesser and greater curvature of the stomach by turning him, energetically right and left, before the shadow of the filled intestines can interfere. At the same time I observe the rapidity of filling of the duodenum. The second half of the meal the patient consumes in the dressing room, while I am completing the first phase of examination of another patient.

After having consumed the full meal, the patient is again roentgenoscoped to observe the tonus, position, peristaltic action and secretion. Careful examination is then made of the prepyloric part and of the duodenum. The diaphragm is closed to illuminate an area 10 by 15 cm. on

the screen, and the pylorus and the antrum will be projected upon the lower part of this space. The right hand compresses the antrum with the Holzknecht distinctor and thus fills the bulb of the duodenum while the left hand centralizes the diaphragm and the tube on the duodenum. As the cap begins to fill, the patient turns himself, at my direction, slowly, bit by bit to the right. Thus the bulb comes on the right side of the vertebral column and the shadow of the pars descendens duodeni behind that of the cap. At this moment I change the distinctor to my left hand and with my right I turn the patient more and more to the right. The shadow of the spine I have previously eliminated, *the turning to the right continues until the shadow of the pars descendens duodeni comes quite to the left of the shadow of the cap, and thus the cap stands there quite isolated on the*

*Received for publication May 1, 1924.



Fig. 1A

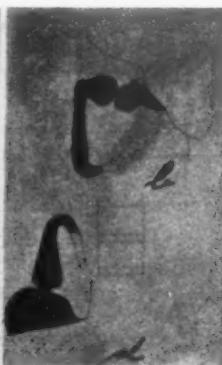


Fig. 1B



Fig. 2.



Fig. 3.



Fig. 4.

A NEW METHOD FOR ROENTGEN EXAMINATION OF THE DUODENUM—RATKOCZI

screen. Meantime the left handed disticator compresses the antrum from time to time, taking care to fill the duodenum and at the same time pushing away the lesser curvature of the stomach.

The explanation of this increased sharpness of the image is that, contrary to the customary methods, where the *background of the bulbus is always the spine* or the *pars descendens duodeni*, or the kidney, the liver and a great mass of the intestines, here it is the *colon, mostly the flexura hepatica, that generally contains gas, thus giving the best contrast*.

My method cannot be used, if one makes his first inspection of the patient four to six hours after the first meal, for then he has the greater part of the meal in the colon. The shadow of the cap then falls upon that of the barium filled colon and cannot be isolated. Examining the jejunum, especially if the colon has first been cleansed by a clysm, the picture of the cap reminds one of that of pneumoperitoneum. With this method one can observe the smallest pathological variations of the cap to the size of a small lentil or even the head of a pin.

Continuing from this optimal angle one can observe the cap in more planes by turning the patient left and right, always remaining in the shadow of the colon, until the shadow of the *pars descendens duodeni* does not cover that of the cap.

If there is difficulty in filling the duodenum in the described manner, I have the patient lie on his right side, half prone for two to five minutes, then examine him once more, just as before. Eventually I let him lie for a second time, to fill the duodenum easily. After lying thus for fifteen minutes the most obstinate pylorus gives way and in more than ninety per cent of cases I examine the patient in standing position. If I cannot fill the duodenum in this

way, I examine the patient on the trochoscope with the same direction of x-rays. The patient lies on his back turned a little to his right side, the tube to the right and downward. The projection of the cap is the same as in standing position.

The form of the well known "cap" must be plainly seen with sharp edges and symmetrical, that is, with the pyloric canal in the middle. If I cannot obtain this after making use of the described technique, having filled the duodenum three or four times with compression of the antrum, I can rightly conclude that there is anatomic or constant spastic variation from the normal.

To make a permanent record of the cases, I make roentgenograms in the same direction of rays, the table being so arranged that plates may be made immediately after the roentgenoscopic examination.

Figure 1 shows projections of the cap seen by various methods: In *a* the patient is turned half right, showing that the spine is projected left but the edges of the cap are in contact with the *pars descendens duodeni* and thus one cannot observe its small deformities; *b* shows the picture obtained by the Chaoul-Stierlin method. In addition to the fact that the compression can cause artificial deformities, there is no opportunity to observe the duodenum on the screen because the background of it is a great mass of intestines; *c* is the figure familiar from the publications of Åkerlund. Having the spine as a background, on the screen you can not observe corpulent patients and again you are obliged to make a series of roentgenograms; *d* shows the cap in the projection described in this paper, the spine and the *pars descendens duodeni* are projected left and the cap isolated with the background of the gas-filled colon.

Figures 2 to 11 are copies of original films diminished in size. Figure 2 shows a normal bulb in the

form of a "cap," in the middle the pyloric canal, under it the prepyloric part, the "antrum" of the stomach. Behind and right of the bulb you see the gas filled colon, giving the excellent contrast like a pneumoperitoneum, over the colon the sharp edge of the liver, left of the bulb the indistinct shadow of the lesser curvature, and of the spine.

Figure 3 is the same form of bulb, but there you can see the genu superior duodeni, and one small part of the *pars descendens duodeni*. It well shows the lesser curvature of the stomach and the place where the compression should be made. It is where a small part of the spine is seen through the stomach extraduodenal.

Figure 4 demonstrates the elongated form of the bulb with peristalsis on the lateral edge, showing also the *pars descendens duodeni* in full size.

Figure 5 is one of the most instructive. On the lateral edge there is a durable spastic contraction (Cole delect), on the opposite side a small recess, the size of a lentil. In the background the colon, above the liver, left of the bulb the indistinct *pars descendens duodeni*.

Figure 6. Ulcus callosum parapyloricum duodeni with large defect on the basis of the cap, with deformity of the prepyloric part and of the whole cap. The *pars descendens duodeni*, the colon and the liver are well seen.

Figure 7. Ulcus callosum duodeni with adhesions of the periduodenum. The figure shown is the constant form of the bulb observed during a long time on the screen.

Figure 8 is the hour-glass variation of the duodenum caused by an *ulcus callosum duodeni*, two centimeters over the pylorus. The deformity of the whole bulb and the *pars descendens* are well seen.

Figure 9 is made on the trochoscope. The duodenum could not be



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

filled for a long time in standing position. The picture is like those made in standing. The greater part of the bulb is projected into the colon, allowing a good look at the

spastic contraction on the lateral edge one-half centimeter over the pylorus. The genu superior is projected into the shadow of the liver.



Fig. 9.



Fig. 10.



Fig. 11.

Figure 10 demonstrates the whole duodenum; over the sharp edged prepyloric part of the stomach the pyloric canal is somewhat asymmetrically localized. The lateral edge of the bulb has a light deformity as a sign of peridiudenal adhesion. The medial edge shows the recess the size of a small pea. The pars descendens, the lesser curvature, is also well seen.

Figure 11 shows an excentric pyloric canal, a sharp edged bulb, but the genu superior is adherent and deformed as a sign of peridiudenal adhesion with the gall-bladder, without a sign of an ulcer.

The colon as a background is allowed in all cases to make the right diagnosis on the screen.

Sequelae of Radiation Therapy*

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THE great increase in the use of radiation therapy during recent years brings to our attention more frequently certain sequelae following radiation therapy. These sequelae are more frequent because of the larger number of patients treated by radiation, because of the fact that in many cases, radiation therapy is used by those not fully informed in the technique of application, because of the present day tendency to employ massive doses of high voltage roentgen rays and because of the frequent use of radium therapy. Their frequency coupled with the prolonged suffering and delay in healing make a better knowledge of these sequelae of radiation therapy imperative.

We are indebted to the early work of Alfred Scott Warthin, M. D., Professor of Pathology at the University of Michigan, for a careful study of the effects of radiation on human tissues. In April, 1905, he presented this subject at a meeting of the Association of American Pathologists and Bacteriologists. This paper was later published in the International Clinics. Since that early date, Doctor Warthin has continued his interest in the subject and has devoted much time to investigation.

Early in the medical employment of roentgen rays, it was found that "the exposure of the skin to prolonged action of the rays was in some cases followed by depilation and degenerative and inflammatory changes somewhat analogous to severe burns."¹

Probably the first microscopical study of the effects of radiation on the tissues was made by Marcuse² in 1896. He made a study of a patient who had been irradiated, following which depilation and dermatitis occurred. His microscopical study was confined to the hair which fell out. He found evidence of degeneration shown by fibrillation of the root of the hair, with swelling of the sheath, loss of outlines of structure in the shaft and obliteration of the lines of the medulla.

In 1897, Gilchrist³ made a microscopical section and study of skin taken from the fingers of a patient suffering from roentgen dermatitis. He found the horny layer thickened and partly detached with many brown pigment granules in the detached portion. There was also an increase in the pigment of the mucous layer, the vessels of the corium were dilated and the number of pigment cells in the upper layers was nearly as great as in the skin of the negro.

Judin, Barthelemy and Darier⁴ made an experimental study of alopecia following the application of

roentgen rays to the skin of guinea pigs. They found great thickening of all the layers of the epidermis, more marked in the horny layer. The hair follicles and glands showed almost complete atrophy. No changes were observed in the blood vessels, nerves, cutis or subcutis.

Kibbe⁵ made microscopic study of skin excised from a roentgen ray burn. The epithelial layers, with the exception of the horny layer, showed disintegration of the nuclei. In the corium inflammatory changes were noted, most marked about the hair follicles.

In 1898, Unna⁶ examined a piece of human skin removed from an area repeatedly exposed to roentgen rays and showing slight reddening and pigmentation. He found the collagenous tissue had become basophile instead of acidophile as in normal tissue. He regarded this as evidence of degeneration.

In 1899, Gassmann⁷ made microscopic study of a deep ulcer produced by roentgen rays. The upper part of the ulcer was made up of necrotic masses and many cocci. In the deeper layers were nuclear remains, fragments of connective tissue bundles and a large number of leukocytes. Below this, normal tissue was found. The blood vessels of the cutis and subcutis showed degeneration of the intima and muscularis characterized by vacuolization. Gassmann was the

*Read at the Denver X-Ray, Radium and Physiotherapy Meeting, Feb. 21, 1924.

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first to advance the theory that the changes in the vessels were the cause of the roentgen ray ulcer and the slow healing characteristic of this type of ulcer.

In 1902, Rudis-Jicinsky⁸ produced roentgen ray burns in the skin of guinea pigs and rabbits for the purpose of studying the microscopic changes. He found evidence of an inflammatory reaction followed by development of fibrous tissue, thickening of the vessel walls and narrowing of their lumina. As a result of the impaired blood supply degenerative changes followed.

During the same year, Pusey⁹ reported that he had found a peculiar degenerative process in irradiated carcinoma masses in which the cells had lost their nuclei and contour and become a structureless mass, hyaline in character and staining a faint blue with hematoxylin.

In 1903, Ellis¹⁰ reported the results of microscopic study of tumors treated by roentgen rays. He found necrosis of cells and trabeculae, fatty degeneration, increase of elastic tissue, lymphocytic infiltration, absence of polymorphonuclear leukocytes and a tendency to endarteritis obliterans through deposits on the intima of the vessels.

In 1904, Gassmann¹¹ studied an x-ray ulcer in the rabbit and noted a cellular infiltration about the perineurium of the nerve trunks. The fibrous connective tissue bundles were broken up and surrounded by a cellular infiltration made up of plasma cells and leukocytes.

In 1905, Vose and Howe¹² reported as the result of the study of 120 cases of skin cancer treated by roentgen rays that the vascular changes are limited to an endarteritis; new blood-vessels form if healing takes place; there is an increase in elastic tissue and mitoses are less abundant after treatment.

Colwell and Russ¹³ cite the results of Scholtz' experiments (1902) and study of the skin as follows: "In the acute, marked edema and general appearances of inflammation are present and the connective tissue cells show slight degrees of change. The cells of the sweat glands are degenerated and in some cases have undergone proliferation into the lumen of the gland. The endothelium of the blood-vessels is vacuolated and degenerated."

This stage is termed by them, after Domonici, the phase of embryonic regression. The process of repair resulting in recovery is called by them, the phase of fibrosis. "In this stage the caliber of the blood channels un-

dergoes diminution, while the connective tissue cells gradually lose their embryonic character and form connective tissue fibres, the general trend of the whole phase being towards the formation of a fibrous scar."

It will be noted that the studies mentioned above have gradually pointed toward the changes found by Colwell and Russ. These men made a comparative study of the action of roentgen ray on the tissues as compared with the action of radium on the tissues. Their conclusions were that there was no essential difference. This is borne out by the statement of MacKee and Andrews¹⁴, when they say: "There is no essential difference between the reactions caused by the two agents" (roentgen ray and radium).

With this picture of the histological action of roentgen rays and radium on the tissues, let us pass to the clinical picture of the sequelae of irradiation. The clinical sequelae may be conveniently divided into the acute and chronic, or better still, the immediate and remote.

The immediate results of radiation on the tissues are microscopical in character, beginning immediately after treatment and followed by the

gross changes commonly recognized as a dermatitis. This type of change more frequently follows low voltage unfiltered roentgen radiation or unfiltered beta radium radiation. This is due to the more escharotic action of these longer wave lengths the dose of which is concentrated in the most superficial tissues because of the low penetrating power of this type of rays.

Following the application of roentgen rays or radium rays to the skin there is a latent period before the macroscopical changes are manifest. This latent period is much shorter when the low penetrating longer rays are used than when the high penetrating shorter rays are used. In the long wave-length irradiation the appearance of the gross changes may be recognized within one to ten days after the dose is given, while in the shorter wave-length irradiation (high voltage roentgen ray or heavily filtered radium ray) the changes will not be recognized until three to six weeks after the application.

IMMEDIATE SEQUELAE.

Dermatitis: The dermatitis showing soon after the application of radiation to the tissues is frequently called a "burn" and clinically this is a suitable use of the word. I shall



Fig. 1—Radiation ulcer of fifteen months duration. This ulcer followed repeated unsuccessful attempts to show renal stone in a man weighing 215 pounds. At the time this photograph was made the ulcer involved the fascia and subcutaneous tissues of the abdominal wall and measured 15 cm. in diameter.

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hope to show later, however, that the remote sequelae should be called by a different appellation because of the different pathology present.

The acute dermatitis or a "ray burn," may be classified under one of three clinical divisions corresponding to the usual classification followed in "heat burns," that is, first, second and third degree. The "ray burn" is of the first degree when an erythema follows the application of the ray but no vesication or tissue destruction occurs. This is the type of reaction sought in the treatment of all benign skin lesions and in the smaller epitheliomas and should seldom be exceeded in the treatment of this type of lesion.

The second degree reaction is that where vesication follows the application of irradiation. Reaction of this severity is seldom necessary, but under proper care will usually subside, leaving the skin intact.

The third degree is that where the deeper layers of the skin or even subcutaneous tissues, muscles and tendons are destroyed. A dose of radiation sufficient to produce this type of reaction is only justified in the treatment of resistant or inoperable malignant neoplasms. Repair following this reaction is slow, accompanied by much pain and leaves permanent deformity.

REMOTE SEQUELAE.

Paper Skin: The remote sequelae of radiation therapy assume several different types, the most common of which is the so-called paper skin. This condition usually follows radiation therapy even of the lightest doses when repeated for any considerable period of time. The hair falls out, the lines of normal skin disappear and the area affected takes on a peculiar transparent appearance suggestive of parchment. Microscopical examination of this skin shows that the malpighian layer of epithelial cells has taken on the character of pavement epithelium, lying flat and parallel to the surface instead of vertical to the surface as is found normally.

Telangiectases: The sequela ranking second in frequency is often found associated with the "paper skin" just mentioned. Since this type of skin is so transparent, the capillaries can frequently be seen giving the bright red lines characteristic of this condition. Telangiectases do not usually show until several months after the treatment has been administered and generally become most marked by the end of the first year. There will usually be no great in-

crease or decrease in the amount of color after this time.

Because of the location of this condition so frequently on the visible parts of the body, face, neck, chest and forearm, much attention has been given to methods of removal. In cases where only a single or very few red lines are present, electrolysis or fulguration may be used, the needle in either method being applied to the arteriole in such a manner as to destroy it. This method will leave some scar even when applied by the most skillful.

Where large areas are covered and there is heavy pigmentation, H. H. Hazen¹⁵ recommends the use of the water-cooled quartz lamp giving off ultraviolet rays. His technique is to use firm compression in order to exsanguinate the skin as much as possible, the quartz window in firm contact with the skin surface to be treated. Fifteen to twenty minutes exposure is used over each area. The author would suggest investigating the time of exposure for the particular lamp being used since this time is much longer than seems wise. In no instance has he found more than two or three treatments necessary to obliterate the vessels. "The results are

a complete obliteration of the dilated blood vessels, but naturally the atrophy of the skin remains unchanged and usually the result in appearance is that of a small slightly whitened scar."

Keratoses and Epitheliomas: These are not so frequently seen following irradiation but do occasionally occur. They have the same appearance as when occurring in skin which has not been previously radiated. A hard scaly patch will show in the skin. This patch repeatedly scales off but never heals. At the same time the skin involved becomes more indurated and thicker. If the keratosis advances to the malignant epithelioma before being treated, it will not only be hard and thick but will be elevated above the level of the surrounding skin. In neglected cases, it will reach the stage of ulceration and will be accompanied by much pain. Epitheliomas occurring in skin previously radiated show unusual resistance to all forms of treatment and show a tendency to early metastasis. This type of epithelioma is found more frequently in those working with roentgen rays or radium. Most of the deaths of pioneer roentgen ray workers were due to metastases from this type of epithelioma. The pio-



Fig. 2—Same patient as Figure 1, at the time of dismissal from treatment. The entire surface is covered over with skin and the induration in the underlying and surrounding parts has disappeared. Ultraviolet radiation, actinotherapy and massage were used. The patient who had suffered severe pain night and day for more than one year was free from pain after the third day of treatment.

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neers did not know the dangers of repeated exposure to roentgen rays until the damage had been done. Nowadays since the dangers are more widely known, the presence of an epithelioma on the hands of a radiologist or technician is *prima facia* evidence of carelessness or ignorance.

The treatment of epithelioma occurring in skin previously radiated is a more difficult problem than the treatment of epithelioma on healthy nonradiated skin. Skin which has been irradiated does not bear the trauma of surgery well. Epithelioma occurring in skin previously irradiated has developed a certain amount of immunity to radiation so that it is more difficult to destroy by further radiation. Degrais and Belot¹⁶ report the successful treatment of this type of epithelioma by radium emanations. The case treated by them had been previously unsuccessfully treated by surgery. Other workers have reported similar success. Aubourg¹⁷ reports a case of multiple epitheliomata occurring on the hands of a radiologist which were successfully treated by applications of carbon dioxide snow for forty seconds, once monthly. After the application of the snow, bismuth was applied and held in place by gauze bandages, and left undisturbed for ten days. The eschar dropped off fifteen to seventeen days later and at the end of two months no trace of the scar remained. During the entire treatment the hands were kept well greased at night with a soothing salve. In thirteen months 23 lesions were thus treated. The carbon dioxide treatment did not prevent the physician from continuing his work.

The application of the high frequency electric current in the commonly called "electrothermic coagulation," has been recommended by some with successful cases as proof of its efficacy.

Indurated Skin, Leatherized Skin: This complication following radiation therapy is only slightly noticeable under low voltage technique and if treatment is stopped and proper physiotherapeutic measures employed, will usually speedily recover. Since the common employment of high voltage x-ray therapy, this sequela is more frequently seen and assumes a degree never before witnessed. It may involve only the skin or may involve the entire abdominal wall, skin, subcutaneous tissues and muscles. The pathology present is the destruction of the elastic fibres of the muscles and replacement by fibrous tissue. The vascular supply at the same time becomes greatly de-

creased. This kind of tissue bears trauma very poorly so that the pressure of a corset, or a slight scratch with a pin may cause an extensive ulceration. This tissue shows little resistance to infection, frequently breaking down and becoming gangrenous.

The treatment for this condition is, first, to stop all radiation. Employ daily treatments of actinotherapy until the skin becomes thoroughly warmed and moist, then follow with massage, being careful not to traumatize. Measures should be employed to prevent undue pressure by the clothing or any other trauma. Recovery is very slow, but if the treatment is faithfully continued over a period of months much improvement will be noted. The elasticity of the muscles will seldom if ever return.

Ulceration: Ulceration is prone to occur in the leatherized tissue mentioned above. The least trauma, such as a scratch with a pin, a blow or a cut will go far beyond its usual extent and will develop into a foul smelling, sluggish ulcer which is very slow in healing.

In other cases where no trauma has been received, the fibrosis of all the tissues, including the obliteration

of the vessels, is constantly progressive over a period of months after the last irradiation. The vascular obliteration finally becomes so extensive that gangrene occurs similar to the gangrene accompanying arteriosclerosis. The area of gangrene will be very small at first but will slowly enlarge until a wide area is involved. The ulcer becomes infected, assumes a dirty gray appearance, is very painful and shows little tendency to heal.

Physiotherapeutic methods offer most in the treatment of the "radiation ulcers," with surgery as an adjunct in specially selected cases. It is very gratifying to note that within two or three days after daily applications of ultraviolet rays from the quartz lamp, the ulcer becomes free from pain. This has been repeatedly observed by the author even in ulcers of one year or more duration. At the same time that ultraviolet radiation is being employed any necrotic tissue should be carefully trimmed out of the wound. Before application of the ultraviolet to the ulcer itself a general treatment with the actinic lamp should be used. This increases the circulation so that the



Fig. 3—Radiation ulcer of abdominal wall following long continued roentgen therapy. At the deep place on a level with the navel the fascia was involved. Complete recovery with epidermization and return of surrounding tissues to normal softness. Ultraviolet, actinotherapy and massage used.

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ultraviolet can act not only on the wound but on the blood circulating through its base. The ultraviolet is also bactericidal and following two or three days' application the ulcer will become bacteria free. Since the disappearance of the infection from the wound coincides with the cessation of pain, some have advanced the theory that the pain in radiation ulcers is chiefly due to the presence of infection. There is doubtless some impingement on the terminal nerve fibres in the margin of the ulcer which may render the exposed nerves hypersensitive. Figures 1, 2, 3 and 4 show radiation ulcers successfully treated by the physiotherapeutic methods just mentioned.

In some cases surgical treatment offers quicker recovery and more certain results. Bevan¹⁸ recommends the surgical treatment of radiation ulcers. He gives his opinion of the pathology as follows: "The pain in an x-ray burn seems to me to be very much like pain in senile gangrene due to obliteration of the blood vessels and starving of the nerves of their normal supply. . . . and when necrosis occurs it is due to the fact that obliteration of the blood vessels is so complete as to no longer supply the necessary amount of blood to the part."

Under this pathology as a basis, Bevan lays down the rule that in treating radiation ulcers surgically, the entire area of radiated skin must be excised and the remaining defect covered with Thiersch grafts. He cites two cases of radiation ulcer oc-

curred on the anterior surface of the tibia and treated successfully by this method.

J. W. Duncan, in cooperation with the author, has employed other surgical methods successfully. One case of radiation ulcer on the dorsum of the hand (Figures 5 and 6) was treated successfully by making a tubular flap on the abdomen under which the hand was fastened until the flap had become firmly attached to the hand. At this stage the flap was severed from the abdomen and the hand freed.

In another case of radiation ulcer over the sacrum, Thiersch grafts were employed successfully.

In another case of ulcer over the sacrum, Geo. F. Simanek used a sliding flap from higher in the loin to close the defect made by surgical excision of the sacral ulcer.

Whether surgical treatment or physiotherapy is used in caring for radiation ulcers, the process of recovery is slow and the patient requires the closest personal supervision by some one familiar with the underlying pathology.

Portions of the Body Which Bear Radiation Poorly: There are several areas in which the skin bears radiation poorly. These areas are where there is little or no subcutaneous tissue and where the vascular supply is normally very poor. The back of the hand, the dorsum of the foot, the anterior surface of the tibia and the mastoid region are especially important. In one case observed by the author, a case of chronic eczema over

the anterior surface of the tibia, roentgen therapy was followed by ulceration which eventually made amputation of the leg necessary. This serious sequela followed only a small dose of roentgen ray.

The locations just mentioned are usually affected by lesions requiring low voltage roentgen rays or thinly filtered radium therapy. There is another place which is frequently affected where high voltage roentgen ray and heavily filtered radium therapy is employed. I refer now to the skin over the sacrum. Wintz¹⁹ calls attention to the injury produced by pressure on the irradiated skin. The author's experience coincides with this. The circulatory damage produced by the irradiation added to that produced by prolonged pressure over the sacrum while lying in the dorsal position, is greater than the tissue will bear, consequently, a slough results.

VARIATIONS IN SENSITIVENESS IN VARIOUS TISSUES.

The Lungs and Pleurae: Since the common use of highly penetrating rays which shoot completely through the body, great opportunity has been afforded to study the effect of radiation on the organs situated within the body. In an extensive study of the effect of radiation on the lungs²⁰, I have previously called attention to certain changes following radiation over the chest. This study has shown that in certain individuals, probably those who have had a previous tuberculous infection which has become quiescent, the application of inten-



Fig. 4—Radiation ulcer following treatment of a mixed cell tumor of the left parotid gland. This ulcer healed with complete epidermization. Ultraviolet, actinotherapy and massage were used.

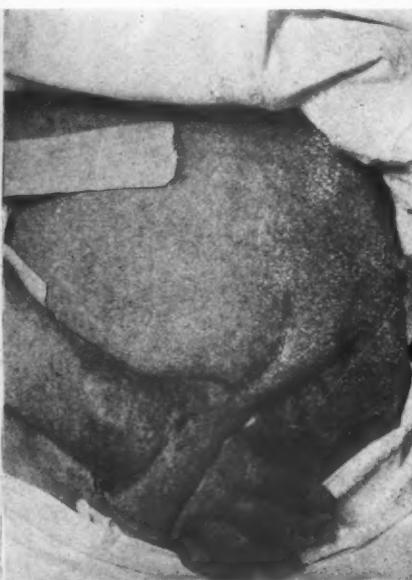


Fig. 5—Radiation ulcer on dorsum of hand treated by surgical curretage followed by application of a graft from the abdominal



wall. Photograph made while hand still attached to abdomen. Courtesy of Dr. J. W. Duncan.

Fig. 6—Same patient as Figure 5. Photograph made after the hand was freed from the abdomen and the graft firmly attached to the site of the ulcer.

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sive radiation is followed by unpleasant sequelae. In these individuals pleuritis and pleural effusion are frequent. Where pleural effusion occurs there is a tendency to massive thickening of the pleura and fibrosis in the lung. These conditions render the affected side almost functionless with consequent dyspnea and cardiac embarrassment.

The Larynx: Because of the superficial location of the larynx it has been known since earliest radiotherapy that the larynx was hypersensitive to radiation. An edema quickly follows treatment and in some cases has been so intense as to require intubation or tracheotomy. Edema of the glottis of sufficient extent to cause suffocation, usually requires about one-hundred and fifty per cent of the skin erythema dose. This dosage can be prevented by proper care in positioning the patient when treating about the neck. In cases of malignancy involving the larynx itself, one must take a chance on edema of the glottis in order to get sufficient dosage into the tumor.

Intestinal Mucosae: The small intestine is not frequently injured by radiation, due to its ready mobility. Because of this mobility, the loops of small bowel usually slip out from under the field of radiation and thus escape an overdose. This is purposefully induced when compression is used over the abdomen during treatment.

The rectum cannot be removed from the field of radiation when treating pelvic carcinoma, hence it is more frequently affected. The patient will suffer from frequent stools accompanied by tenesmus and, in severe cases, by bleeding. These symptoms usually subside in a few days and leave no bad after effects.

Suprarenal Glands: In extensive cases of carcinoma of the stomach or other new growths situated near the under surface of the diaphragm, intensive dosage of the suprarenal glands cannot be avoided. Smithies²¹ has reported one case of overdose of the suprarenals which was followed by death. Earlier in my experience

with deep roentgen ray therapy, I had one patient who received too large a dose over the suprarenals. Hypodermic administration of adrenalin chloride kept the blood pressure up for several days, after which the glands recovered their function. It is my opinion that more accurate measurement of dosage and better knowledge of effects of radiation will make this injury to the suprarenals uncommon if not even unnecessary.

CONCLUSIONS.

This study of injuries following radiation is presented not with the idea of discrediting the value of this therapeutic agent, but with the idea that better knowledge will lead to better results with fewer complications. The literature has been carefully reviewed and the author's personal experience has been added. In proportion to the total number of patients treated these unhappy complications have been very infrequent. This is especially significant in that the great percentage of cases treated are hopelessly inoperable when presented.

REFERENCES.

1. Warthin, A. S.: An experimental study of the effects of roentgen rays upon the blood-forming organs, with especial reference to the treatment of leukemia. *The Physician and Surgeon* 29:1-12. 1907.
2. Marcuse, W.: Dermatitis and alopecia following upon x-ray treatment. *Deutsche med. Wochenschr.* 22: 481-483. 1896; further report *ibid* p. 681. *Abstracted Muenchen. med. Wochenschr.* 43:706. July 1896.
3. Gilchrist, T. C.: A case of dermatitis due to x-rays. *Bull. Johns Hopkins Hosp.* 8:17-23. 1897; further report *ibid* p. 46.
4. Oudin, Barthelemy, Darier: Changes in skin and viscera after x-ray radiation. *Monatschr. f. prakt. Dermat.*, Hamburg, 25:417-445. 1897.
5. Kibbe, A. B.: A case of x-ray dermatitis caused by the roentgen rays with the results of microscopic examination of the affected skin. *New York M. J.*, 65:71-73. 1897.
6. Unna, P. G.: Changes in skin following x-ray radiation. *Deutsche med. Zeitung*, 19:197. 1898.
7. Gassmann, A.: Histological study of an x-ray ulcer. *Fortschritte auf d. Geb. d. Roentgenstrahl.* 2:199-207. 1898-1899.
8. Rudis-Jikinsky, J.: New York M. J., 75:487-490. 1902.
9. Pusey, A.: *Jour. A. M. A.*, 38:911-919. 1902.
10. Ellis, A. G.: Pathology of tissue changes induced by the x-ray. *Am. J. M. Sc.*, 125:85-95. Jan., 1903.
11. Gassmann, A.: Histological findings in an x-ray ulcer in a rabbit. *Arch. f. Dermat. u. Syph.*, 70:97-102. 1904.
12. Vose, R. H., & Howe, W. C.: *J. M. Research*, 13:167-185. 1905.
13. Colwell, H., & Russ: Radium, X-Rays and the Living Cell. 1915, p. 158.
14. MacKee, G. M., & Andrews, G. C.: Radium dermatitis and radium dermatitis, a comparison, *Arch. Dermat. & Syph.*, 4:213-216. 1921.
15. Hazen, H. H.: Ultraviolet ray in the treatment of roentgen-ray telangiectasis. *Am. J. Roentgenol.*, 9:101. Feb., 1922.
16. Degrais, P., & Belot, A.: Radium treatment of roentgen ray dermatitis. *Presse med. Paris*, 28:364. June 5, 1920.
17. Aubourg, P.: Cure of radio-dermatitis with carbon dioxide snow. *Radiol. et d'Electrol.*, Paris, 3:217. May, 1918.
18. Bevan, A. D.: X-ray burns. *Surg. Clin. N. A.*, 1:935-943. Aug., 1921.
19. Wintz, H.: Injuries from roentgen rays in deep therapy. *Am. J. Roentgenol.*, 10:140-147. Feb., 1923.
20. Tyler, A. F., & Blackman, J. R.: Effect of heavy radiation on the pleurae and lungs. *J. Radiol.*, 3: 469-475. Nov., 1922.
21. Smithies, F.: Necessity for caution in the employment of high voltage roentgen rays as a therapeutic agent against malignant disease; acute adrenal insufficiency and death as sequelae. *Surg. Gynec. Obst.*, 36: 61-63. Jan., 1923.

Physiotherapy Treatment of Bone and Joint Injuries*

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THE treatment of any bone or joint injury will depend in a great measure upon the length of time that has elapsed between the receipt of injury and institution of treatment. For the purpose of this discussion we will divide these cases into three classes as to time of treatment:

1. Those cases seen within the first few hours following injury.
2. Those cases seen after two to four weeks have elapsed.
3. Those cases seen six weeks to six months after injury.

As to the class of injuries we will be limited to bruises in and about joints, sprains and fractures.

The initial stage of every inflammatory process is irritation, the cause of which may be either thermic, chemic, toxic or traumatic. Consequently following trauma of whatever nature or degree we have an inflammatory reaction with its classical symptoms of tumor, rubor, color and dolor.

Let us now analyze the classical symptoms of inflammation in the order in which they manifest themselves. First of all, we have an irritation which in the cases under discussion is traumatic in origin. The irritation through its action upon the local vasodilators and vasoconstrictors of the arterioles and capillaries produces a dilatation of these vessels, resulting in an immediate increased blood supply to the part. This accounts for the redness and likewise the increased heat, for while the part seems hot as compared to the rest of the body, there is no local hyperemia, or the temperature of the part is no higher than the temperature of the blood.

Nature's method of allaying irritation in any part of the body is to pour out an excess of fluid in the injured part. That the job is many times overdone is evidenced by cases of pleural, pericardial, peritoneal, joint, and many other effusions when an excess of fluid has been poured out.

*Read at a meeting of the Iowa X-Ray, Radium and Physiotherapy Society, Des Moines, Iowa, Feb. 27, 1924.

The extravasation of fluid into the tissues as a result of the effort to relieve the local irritation, causes the tissues to become edematous and swollen. This accounts for the tumor or swelling, the extent of which will depend upon the amount of the serum that has been extravasated into the lymph spaces.

The pain is due to overstretching of the sensitive tissues due to the accumulation of the exudate producing pressure on the sensitive nerve endings.

Inflammation may therefore be defined as a complicated vascular and cellular response which follows almost immediately upon an injury and is adapted by bringing much blood to the part and pouring out elements upon the injured tissues to prevent the extension of the injury, and to hold in check the injurious agent or even destroy it.

In a case of injury in the joint region, for example the ankle, such as a so-called bruise or sprain, what particular thing is responsible for the disability?

The pain, of course. But why so much excruciating pain when we may have only a slight tearing or laceration of the soft parts in this region? We are all aware that if we get but little swelling only a moderate or trifling amount of pain will be experienced, and our conclusion is that the injury was only a slight one because there was but little swelling and pain. The seriousness of the original injury is usually gauged by the amount of pain and swelling. This, however, is fallacious. Who has not seen what was seemingly a very trivial injury or sprain of the ankle become markedly swollen and extremely painful, producing disability for a week or two, while at another time an injury of the same degree would produce only a slight lameness for a day or two with little or no disability?

Wherein lies the difference? The difference is in the amount of fluid poured out in the tissues in nature's effort to combat or limit the extension of the irritation. If nature is generous or overenthusiastic, as is sometimes the case, and an excess of

serum is poured out resulting in an extensive edema, a proportionate swelling occurs with its consequent pain and disability. The edema, of itself, produces additional injury by laceration of the muscle sheaths and by traumatizing the soft tissues.

This same sequence maintains following trauma of the tissues anywhere in the body and becomes a problem for consideration in the treatment of all bone and joint injuries as every case of this kind has associated with it lesions of the soft tissues. And as the swelling and consequent pain originate principally in the soft tissues, consideration of these facts and attention directed to their relief will contribute much to the comfort of the patient.

From the foregoing it is evident that treatment should be instituted as soon as possible following the injury, before the usual edema and swelling occur. However, these conditions are no barrier or contra-indication for treatment; but all agree that "an ounce of prevention is worth a pound of cure," and that it would be better to prevent the edema, swelling and pain, rather than wait till these symptoms are present and then attempt to relieve them.

Given a case of severe sprain of the ankle, with immediate extensive swelling and consequent pain, how shall we proceed?

First, there should be a thorough examination, which can be made only with the x-ray. A fluoroscopic examination will not suffice. Pictures must be taken in both planes, or better still, taken stereoscopically.

Fractures will be detected many times with this kind of examination that otherwise would be overlooked.

The presence of a small fracture makes no difference so far as treatment is concerned, but it is a mighty good thing for the physician to know, particularly, if for any reason the case should pass out of his hands and the patient later be apprised of the fact that he had a broken leg.

Our effort in the treatment of a case of this kind is directed to the relief of pain and we do this by relieving or preventing the one thing that is causing the pain, the edema.

PHYSIOTHERAPY OF BONE AND JOINT INJURIES—FOUTS

This is accomplished by the use of diathermy after the following technique:

If the pain permits the foot to hang down, it is placed in a basin of salt water and a combination of the cuff and salt water electrode method is employed. The cuff is placed well above the ankle on the calf of the leg, and care is taken that the cuff is only tight enough to insure contact, also it must be loosened and reapplied from time to time during the course of treatment which should last thirty minutes to an hour. If it is not loosened it will become a constriction and impediment to the return circulation within a few minutes after the treatment is begun. The electrodes may be applied laterally, if so desired, but the combination method, if it can be employed, seems better. The greatest amount of heat is produced at the point where it is most needed, and the efferent vessels higher up the leg are dilated, favoring the return flow of the lymph.

Another factor which contributes to the pain in a great measure is the spasm of the muscles. The sedative action of diathermy relieves this by relaxing the muscle spasm.

The efferent lymph channels are opened and edema and swelling are prevented, if treatment is instituted early, or if already present, they are quite promptly dissipated. During the treatment and for a few minutes following, gentle massage from below upward will materially assist in the process.

After the treatment, the limb is covered with a thin layer of cotton, an extra layer being placed below the malleolus, and an elastic bandage applied from the toes to the calf of the leg. The limb is kept elevated and in six hours the treatment is repeated. With the edema and swelling eliminated, the pain is reduced to a minimum and is of small consequence. When the edema and swelling have been held in check for 36 to 48 hours, the ankle is strapped with adhesive tape after the usual fashion and the patient walks with but little pain or inconvenience.

If treatment is not instituted early, marked edema occurs, which means additional trauma and pain. As the fluid coagulates and healing takes place, it binds together the muscle and tendon sheaths along with the surrounding tissues, so that when motion begins to be reestablished, the movement occasions acute pain by the pulling and tearing of the adhesions so formed, resulting in lameness and disability for a varying length of time.

What has been said about physiotherapy treatment of sprains applies equally well in the treatment of fractures, providing the fracture is of such a nature as to admit of this form of treatment.

In every fracture we have the same physiological phenomena taking place that we have in sprain and we have the fracture of the bone in addition. If the fracture is properly reduced and the limb put at absolute rest by splinting to prevent muscle spasm, but very little pain occurs unless there is extensive edema and swelling.

For illustration, in a fracture of the forearm, after the fragments have been properly reduced, our efforts should be directed toward preventing edema and swelling. If the injury is such that it may be treated in this manner, diathermy may be given by the application of metal splints applied directly to the forearm, and extending well up to the elbow. After a thirty to forty-five minute treatment, the muscle spasm is relieved, the efferent channels are opened and edema and swelling reduced to a minimum. With these conditions relieved the pain is of small consequence. The part is kept continually elevated during the treatment and for 36 to 48 hours following. Treatment may be repeated three or four times during this period after which a plaster cast or whatever form of splint desired may be applied and the patient becomes ambulatory.

This treatment not only lessens pain during the first few days, but it has the distinct advantage of eliminating the additional trauma caused by the edema and the resulting fibrosis of the soft tissues after healing has taken place.

Upon removing a cast or splints after four to six weeks, we have often been impressed by the flabby, atrophied muscles in some cases and in others by the partial loss of function due to fibrosis of the muscles and the difficulty encountered in restoring this function.

The atrophy is simply the result of nonuse, while the latter condition is secondary to the healing process that has taken place in the tissues following the trauma incident to edema. In the process of resolution following edema the fluid coagulates, and as healing takes place it binds together the muscle sheaths with a resulting fibrosis which must be overcome before complete function is restored.

This condition may be overcome or prevented if proper treatment is

instituted. The muscular contractions elicited by the early electrical stimulation enables the muscles and tendons to free themselves from the intra and perimuscular adhesions that are in the process of formation, thereby preventing the usual disability frequently present in these cases.

Automuscular massage has a favorable influence upon the edema by dispersing the effused lymph. This procedure may be carried out by utilizing the faradic current with a mechanical surge, so controlled that we may begin the treatment with very light stimulation and contractions, increasing in strength as the case progresses.

Treatment may be begun three or four days following the injury and be carried on without disturbing the splints if one makes application over the motor points higher up the limb. If bipolar contact is desired, this may be done by means of a water soaked electrode applied to the hand. In this way fibrosis and muscular atrophy are eliminated.

In the cases seen several weeks or months after the injury and in which firm fibrosis or ankylosis has taken place, the foregoing measures are supplemented with x-ray and manual manipulation. These are the cases that demand an unlimited amount of patience and perseverance. Here massage and manipulation play a great part and the results obtained will depend much upon the judicious administration of these measures.

A preliminary treatment of diathermy materially assists by inducing a relaxation of the parts. We believe the x-ray is the best solvent known for fibrosed tissues. Its action upon scar tissue is too well known to necessitate further discussion. It is employed in small doses, one-third of an erythema dose, once a week.

In addition to massage and manipulation, the faradic surge is employed, as it affords a very convenient and efficient mechanical means of exercise and is of distinct value.

SUMMARY.

1. Diathermy is of value in bone and joint injuries and should be used early. It relieves muscle spasm, prevents edema and lessens pain.
2. By controlling edema and swelling, further traumatizing of tissue and the resulting fibrosis is prevented.
3. Fibrosis of soft tissues may be prevented by early employment of electrical stimulation. If treat-

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ment is continued and increased in strength, it will prevent atrophy of the muscles.

4. In cases of long standing with fibrosis and ankylosis, diathermy is of value preliminary to massage manipulation.

5. Small doses of x-ray assist in the absorption of scar tissue.

6. Massage and manipulation consistently employed is of greatest value in cases of old standing.

The value of physiotherapeutic measures is not understood or appreciated by the vast majority of physi-

cians, and for this reason is not regarded with favor. However, physiotherapy has distinct value and is entitled to a place in medicine. Positive proof obtained by these measures merits a conscientious consideration from every physician interested in doing better work.

A Plea for Closer Cooperation Between the Internist and Roentgenologist in Diagnosis*

W. A. RUSH, M. D.

Beatrice, Nebraska.

IF WE view the progress of medicine in retrospect and review the various stages of its development, we note certain reactions to those evolutionary changes, many of which force us, seldom precipitately, usually gradually, to alter our methods to conform to these changes.

Seldom, perhaps never, has any marked or distinctive change come about that did not result in real progressive achievement. However, coincident with this progression there have usually been three accompanying reactions. First, the overenthusiasm of the hyperzealot that leads to ridiculous flights of fancy. Second, a backward swinging of the pendulum to the opposite extreme of pessimism, when the superficial thinker and flighty minded were ready to cast overboard the entire proposition because of the ridiculous extreme to which the hyperzealous exponents of the new thought had been carried. "Every action has its reaction" and I have mentioned the two extremes of reaction. Fortunately a third asserts itself and that brings the pendulum to a point of stability where the happy medium is achieved.

This point is never arrived at hurriedly but always comes about as the achievement of the analytical, sober minded individual who weighs carefully the evidence, accepting those things as of value only when proven so in the light of practical application and crucial test. Nowhere have I seen this exemplified more typically than in the field of x-ray. It is true of both its diagnostic and therapeutic phases.

*Read at a meeting of the Nebraska Radiological Society, Omaha, May 12, 1924.

Since this paper deals with the feature of cooperation between internist and roentgenologist, I write the above as a preface, also as a recapitulation of what has been and is now happening in roentgenology where the fields of x-ray and internal medicine blend.

Considered as distinct phases of time, involving the entire profession, it would be most difficult to divide the reaction to the use of x-ray into the three fields mentioned above. It is perhaps more a personal reaction of the individual practitioner, than a reaction of the profession en masse.

Any attempt at readjustment that may more rapidly result in the creation of a reasonable attitude of internist, surgeon and radiologist to each other seems timely.

In this discussion I make very little distinction between the individual practitioner, the one purely an internist, the other purely a radiologist, and the single individual who is practicing in both fields, or to put it differently, the internist who does his own x-ray work. Dual personalities conflict quite as much as dual personages, it seems. We never see a physician who is first a radiologist and then an internist. The reverse sequence prevails. When an internist adds radiology to his personal equipment, he is influenced by the same allurements as the internist who adds a radiologist to his association.

If I were ill, I certainly would prefer that my case be handled by an ultraconservative, rather than an ultra-enthusiast of any one school or method of diagnosis and therapeutics. The elimination of the ultra would, however, in both cases be wholesome.

The preceding remarks make it almost unnecessary to continue this

paper, for by this time you will have realized that this is a plea for conservatism in the use of diagnostic and therapeutic methods. What follows is my suggestion as how best to accomplish these ends.

We who tread the path of a specialty in medicine are responsible to a large extent, because undue enthusiasm and unjustified and unjustifiable claims in certain fields tend to unbalance rather than stabilize. It seems but natural that one's enthusiasm for his specialty should sometimes lead him to foolish extremes and one of the objects of this paper is to suggest a remedy for this condition.

To those of us who were so fortunate as to have the opportunity of cooperation as we saw it practiced in the United States Army hospitals during the World War, little need be said relative to the value of such unhampered cooperation in stabilizing diagnostic and therapeutic methods.

In that association the element of financial competition was eliminated and a friendly and wholesome cooperation became the rule. Most men took advantage of the opportunity offered to look at one's self from the other fellow's viewpoint and to evaluate one's own methods by comparative analysis. No financial advantage resulted from riding a hobby horse and hobby horse riding became unpopular to most men in uniform.

It seems only human that most, if not all individuals, are prone to be unduly influenced by new or spectacular innovations. X-ray decidedly is not new, but its popular adoption by the medical profession at large is quite new and therefore alluring, perhaps partly because it has a spec-

COOPERATION BETWEEN THE INTERNIST AND ROENTGENOLOGIST—RUSH

tacular element. So much so that all over the country we find men adding x-ray equipment without first acquiring or realizing the absolute necessity of familiarizing themselves with the expression of pathology in terms of shadows produced by the x-ray.

But a few moments of sober consideration will impress one with the pertinent fact that x-ray can not supplant the older methods of diagnosis. That it is a most wonderful aid in diagnosis and therapeutics cannot be denied. It comes as an adjunct to older methods and is indeed truly marvelous and when used as such becomes a boundless blessing.

To put it in its proper sphere and keep it there will result in good for all concerned. How best to do this is the crux of this paper. This can only be accomplished by intimate association and cooperation.

I am very enthusiastic about this feature of medicine. I have been in practice long enough to enable me to speak from personal experience of the time when diagnosis was practically exclusively a matter of the individual effort of one man working alone. Just here let me be understood. I do not decry the work of men who are forced by circumstances to handle their work alone. These are the men to whom we pay homage for what has been accomplished among the masses in bringing medical achievement to its present high level.

I have seen what we recognize as medical centers the world over become such because of cooperation among men working in different fields of medicine and surgery, bringing their labors to fruition through cooperation. The first large medical group or clinic in America came into being largely because men in different specialties associated themselves together for cooperation to give the patient the best service. Since the war I have carried into realization a vow taken at that time to associate myself with men working in other fields of medicine and surgery because of my faith in such methods for bringing out the best there is in our profession. I am happy to say that these associations have been so pleasant and so productive of satisfactory results to all concerned that

I feel it my duty to so express myself in order that others who may desire to establish such relationships may feel encouraged to do so.

I cannot help but feel sorry for the roentgenologist who is forced to work alone, not having the balancing factor of association with good internists and surgeons to keep him out of dangerous ruts. Remember that physical diagnosis and history study is centuries old and is not to be upset in a day, therefore you will do well to keep up to the minute on the older methods or else associate yourself with others who do.

I feel equally sorry for the man who is so blinded by faith in himself and the older methods that he can not give credit to the man who can visualize for him hidden pathology even though it be but shadows that are portrayed.

Shakespeare's advice is as timely today as when penned, "Be not the first by whom the new is tried, nor yet the last to lay the old aside."

When thinking on this subject, I often recall my days in medical college when we were being taught diagnosis. Consider diagnosis of the stomach, which I use here to illustrate my point. From the standpoint of physical diagnostic methods the stomach is an organ peculiarly difficult to deal with. Information as to size, position, contour, mobility, form, definite location of tender points, tonicity, peristalsis, motility, et cetera, were especially difficult to determine. However, we attempted to determine these factors by methods very crude, cumbersome and untrustworthy. Today the internist can analyze his case history, make his physical findings and then turn to his roentgenologist and ask him to furnish this data with a feeling that the information thus obtained is indeed very reliable.

The same features prevail in many other fields of diagnosis. With this information he proceeds to conclusions as to diagnosis and indications for treatment with more confidence and assurance that he is rendering his patients good service.

In conclusion may I add that while the message of this paper may seem unnecessary, I feel that any effort that may bring our profession closer together in a spirit of helpfulness

and cooperation is worth while. Furthermore, I am impelled to write as I do because of love and jealousy for my specialty, radiology. It is quite disconcerting to see it being misused as it positively is. This country is being flooded with x-ray equipment used by men who have made no special study to prepare them for its intelligent use. Because of the fact that they are primarily internists, surgeons or general practitioners their interests are not focused on x-ray and they therefore do not become competent.

We who do give radiology our exclusive attention are embarrassed constantly by reported findings of technicians in the employ of some physician, or by findings of a physician who is primarily anything than a radiologist but who plays at x-ray. Because these reports emanate from the doctor himself, they carry much weight with the patient and place us in an embarrassing position, forcing us to compromise or otherwise deal with such awkward situations that come out of such bungling.

A concrete example and I close. Not long since, a patient who was forced to change physicians, because of absence from the home city of the doctor who had been in charge of her case, was brought to my office by the physician then in charge for an examination of her gastro-intestinal tract. At the close of my examination I told her that I found no evidence of any trouble in her stomach. The patient, an intelligent woman, stated that her first doctor, in whom she has much confidence, had examined her by x-ray and had pointed out ten separate and distinct ulcers in her stomach. The facts were these: A technician does this physician's x-ray work, he backs up his technician's report by the force of his own opinion and this carries quite as much weight with his patient as would the opinion of a trained roentgenologist because most patients see no reason for distinguishing between these opinions. As a matter of fact, what was reported as ulcers were overlapping shadows of barium in the small bowel, breaking the normal contours of the gastric silhouette.

Some of the Practical Points in Physiotherapy from the Standpoint of the General Physician*

A. L. JUDD, M. D.,

Kanawha, Iowa.

THE subject allotted to me today is one that should be of vital interest to every one in general practice. Those of us who are in earnest in our work, and I believe the majority of us are, will be in continual search of such remedies or other methods whereby we can most successfully treat ailing humanity. The investigations at Chicago some time ago relative to the feeling of the laity toward physicians in general points to a seeming lack of confidence. If this is an index of the general feeling over the country, it seems to me there must be some reason for such a feeling, and an inventory of ourselves might well be made with a view toward finding out and correcting any such fault if such there is. It would at least be a good plan to read and reread a report which was published in the Illinois Medical Journal for July, 1923, and recopied quite generally. When we consider the change that has taken place in medical practice during the last fifty years, the new fads, cults, and isms that are springing up and the publication in some of the so-called prominent magazines of articles condemning smallpox vaccine and the like, can we wonder that the public does not know what to believe? The educated public, those who read and investigate things, as a rule do appreciate the efforts being made by the medical profession for their relief, but the many others who are so easily influenced count largely in our clientele and must be taken into consideration.

In an active practice covering twenty-two years, with attendance at many medical meetings and clinics, I cannot help but notice the continual search for something that will shorten the time of sickness or put injured patients back at work in less time than has been required in the past, not forgetting the chronic cases. The rush and hurry of our present day demand this. We want definite

results. In the past we obtained fair results, in some cases from the use of superheated air and other appliances that were not so well perfected as now. There must be some good in all systems of healing and instead of calling those who use them charlatans and quacks and demanding a closed door in favor of the medical profession, it would be much better for us to investigate these systems and, as far as they possess merit, apply them to our work.

I would like to ask you to think back not so many years and recall that the man who used electricity was considered rather a quack by a great many. Why? Largely because, in many instances, electricity was used simply as a side issue and usually by men who knew nothing of its principles, neither would they take the time to learn or try to perfect themselves in it, with the result that much less good was accomplished than otherwise could have been had they understood their work in this line. This will apply today as well as then, except that there are now better opportunities to obtain instruction. Electricity is not a cure-all and cannot be considered as such; yet it is a most wonderful aid and who knows from the rapid strides now being made what the next few years will bring forth?

Common sense is required in the use of electricity as in anything else. If we expect to be successful in using it we must understand its basic principles and be willing to continue the study as new discoveries are made. To hear some of our brethren condemn diathermy and other physiotherapy apparatus without investigation or at least without study, is along the same line mentioned above. One would not make a very great success in medical practice if he were guessing at the physiological action of drugs and how can he expect results from electricity without studying the subject?

Moreover, you must take the patient into consideration, e. g., the fear that some people have of all electrical devices. They soon learn

that the high frequency machine is carrying high voltage, and they do not understand the method of raising the frequency, therefore, they naturally think of a death dealing current. If the physiotherapist is so unfortunate as to burn one of these patients he will soon hear about it from many sources, and each version will be magnified. One may always do more harm by one unwise treatment than can be undone by many successful ones. I have made it a rule to try things upon myself, thus I learn how the various treatments feel to my patients. It makes me more careful and besides this it gives me information not otherwise obtainable. Keep a close record of what you do also. It will make you a better doctor and enable you to keep a check on things from day to day and will allow you to judge of your own successes and failures, besides coming in very nicely if you should be called into court.

A great many men who are taking up this work have been in general practice for years. Some are sincere in their desire to aid suffering humanity as well as to gain a livelihood. Others think only of the financial side. My belief is that an honest sympathy for your patient's condition and a real love for your work will do more to prolong your earthly existence than will a medium sized gland graft. If we make physiotherapy count for anything as a whole, it will be because we stand together and study our technique, proving to those who oppose anything outside of the beaten path that we are able to do things really worth while by these methods. The opposition by some is nothing more than an unwillingness to deviate from methods they have used from the early days of their practice. Is it not reasonable to expect improvements in this line of treatment as well as in any other? Let us be broad enough to at least be willing to make a fair investigation of the merits of modern improvements.

Electrical effects are not psychic as some individuals seem to think. Their claim that just as good results

*Read at a meeting of the Iowa X-Ray, Radium and Physiotherapy Society, Feb. 28, 1924.

PHYSIOTHERAPY FROM STANDPOINT OF GENERAL PHYSICIAN—JUDD

are obtained from external heat, mud baths, etc., is erroneous, for it is impossible to heat deep lying structures by simply increasing the heat applied externally, as the more intense the local application of heat the larger the amount of blood rushed to and through the part, thus carrying away as much excess heat as possible. For simply heating the skin, radiant light and local applications are better than diathermy. The heat generated by diathermy, as you have been taught, is not on the skin but is most intense midway between the electrodes, provided that they have been placed properly, and it is generated from resistance of tissues to current. The great advantage is that heat can be generated so gently and gradually as not to arouse the reflexes at all, or only partially. The heat can be brought to any point desired by varying the size of the electrodes and it is more intense near the smaller one.

Fibrous tissue, the one we so often have to treat, seems to respond more easily and to heat up faster and to hold heat better; thus, such tissue if new, will often disappear under diathermy. Old fibrous tissue can be softened and made to stretch more easily and removed by subsequent massage. Blood and lymph vessels are dilated, thus carrying away the products of inflammation.

To give you some idea of what can be accomplished by a general practitioner I will cite a few cases that I have treated, the reports being copied from our case records.

A. L. W., age 71: Called to patient at 10:25 a. m. A history of flu for four days. Patient had had pneumonia twice in his life, nearly died in one attack. Found his temperature to be 100, pulse 75, respiration 25. Very severe pain over lower portion left lung since 2 a. m. Examination showed many rales, jerky breathing, red tinged expectoration and rather pale. Used my best efforts to break it up and upon calling at 5:30 p. m. found the patient's condition worse. His temperature was 102, pulse 80, respiration 30, very severe pain in the side and the general condition aggravated.

He was brought from his country home to my rooms and by the time we had him in bed he was a very sick man, badly cyanosed, hardly able to get his breath for pain and was gasping continually. His lung was filling and he had all the indications of lobar pneumonia. I applied well soaped block tin electrodes (size four by four inches anterior and four

by five inches posterior), with a bandage to make sure that they stayed where we wanted them and that any chance of burning was eliminated. We started the current slowly, gradually raising to as hot as the patient could stand and in exactly fifteen minutes he gave a gasp and took a deep breath, exclaiming that it was the best he had had since two o'clock the previous morning. Twenty minutes after we started the diathermy we could see an improvement in his color. He continued to take deep breaths and said that the pain was not severe except upon deeper breathing. We continued the treatment as hot as he could comfortably stand it for twenty-five minutes longer, making a total of forty minutes all told. The electrodes were then removed and he was well covered. He was perspiring freely and said that he felt much better. He passed a fair night and the next morning was expectorating freely. No medicine was given at all.

He remained with us for a week with no trouble except a low pulse and rather a hard cough. We gave him several diathermy treatments with stimulants and some adrenalin which soon raised his pulse. He was the happiest man you ever saw and most thankful that he did not have to go through what he had experienced before. In the light of my experience I am positive that we had a real case of pneumonia that was aborted by diathermy.

J. F., age 30: History of intermittent rheumatism of the joints for some time. The patient came to us with one ankle badly swollen and very painful, other joints were tender to the touch. He had some bad teeth and these he had extracted. Treatment consisted of oxyl iodide compound with free elimination and diathermy cuff around the leg, five inches above the joint. His foot was placed in a shallow pan of saline solution, heated as hot as he could comfortably stand. Relief of pain followed in fifteen minutes. Let me note here that in case of an aching pain along the tendon of Achilles, after starting treatment, the current should be reduced until the pain leaves, if necessary one may have to continue treatment at lower heat and a longer time as I have noticed that we have this trouble in some of the cuff methods.

The other joints were treated in a similar manner and finding him somewhat anemic we gave him ten actinic ray treatments which resulted in his feeling quite well again and he has since made a good recovery.

O. J., age 54: (History as given by the Mayo Clinic): "Examination here last November. He complained of nervousness and dizziness with trembling of hands and feet. His general condition was relatively negative throughout, with the exception of a moderate hypotension as his systolic pressure ranges from 170 to 180, diastolic 100. We felt that his symptoms were secondary to cerebral arteriosclerosis. He was given a complete neurological examination and there did not seem to be very much we could do to improve him. We have no definite suggestions to give you in regard to treatment but would prefer to leave the matter entirely in your hands, being pleased to hear from you if further developments make a change of diagnosis possible." His wife was advised not to go to any expense for treatments of any kind as it was regarded as useless.

The patient was very constipated and was using large amounts of cascara. When he came to me he had a systolic pressure of 180, diastolic pressure was unobtainable. The urine was negative except for a very low phosphate index. He was given nux vomica and phosphate compound and D'Arsonval treatments followed by sine wave sinusoidal pad on the back, first one on the right and then on the left inguinal region, ten minutes each side, eleven waves per minute. He has been under treatment since December 1st with the medical and electrical treatments since January 12th. His systolic pressure February 15th was 155, diastolic 95, as it was on February 19th. He is feeling better, looks better, the dizzy attacks are further apart and not so severe and he does not require as much cascara as before. He is less nervous and is able to do some work around the house and barn and feels much encouraged. I do not know what the outcome will be but I hope at least to give him a longer lease on life and to make it more pleasant while it lasts. I think we ought to try, at least, to do something for these cases.

H. M., age 24: Came to my office in great pain following a kick-back while cranking a Ford. The x-ray showed a complete fracture of the radius and ulna at epiphyseal junction and fracture line running into joint. Manipulation replaced the fragments without great effort and the wrist was placed in an infrared compress with heat as hot as could be easily borne. Within thirty minutes he experienced much relief and treatment was continued thirty minutes more, splints were applied and he received daily

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treatments for three days then seven alternate daily treatments. The result was no further pain on any account, no discoloration, practically no swelling and he was back at work, using this hand, within seven weeks.

I now have under treatment a case of enteroptosis with valvular heart disease which has heretofore put another doctor and myself at our wit's end to do something for the patient. Her blood pressure is normal but gas distension is crowding the heart and causing much trouble. This had run over a considerable period of time and I began the use of diathermy with the anterior electrode over the stomach, the posterior opposite, as hot as the patient could stand for thirty minutes, then sine wave, eleven surges per minute and left inguinal pads one to back, ten minutes each side, with a result after ten treatments that is very gratifying to say the least. This patient can now breathe comfortably, has very little trouble with gas and feels better than she has for years. Treatment will be continued, tapering off gradually until we can see permanent results. If in heart

disease we can give the patient some relief we shall perform a real service.

Not long ago I compiled a paper showing the cause of death of one hundred doctors and you may be surprised to know that sixty per cent of these died from some form of arteriosclerosis or heart trouble. Compilation was made from reports in the Journal of the American Medical Association.

We are trying out diathermy for deafness, using in each ear a cotton covered electrode wet with saline solution or well soaped, this connected to one cord and the other held in the patient's hand. We give treatment as hot as the patient can bear comfortably for eight or ten minutes, then without taking the electrodes from the patient we switch to sinusoidal and massage for three minutes as much as the patient will stand. If you follow out this treatment for a time you will have some happy surprises. I have found this to give relief in acute cases. In one case (where the pain was severe and there was absolutely no bulging or other indication of paracentesis), when

diathermy made the pain worse I promptly made an incision which was followed by immediate relief and the escape of free pus. This helped out the diagnosis.

You do not need a large equipment if you do not care for it but if you begin this work you will soon find that you need more room and equipment as your results become known. The work is all around you if you learn how to do it.

In conclusion let me plead for (1) more painstaking examination of patients in order that you may know what you are attempting to treat; (2) proper equipment; (3) full case records; (4) an office assistant who will take an interest in the work, who knows how to approach people and who is pleasant to have around. (5) Finally a real love for your profession and a desire to learn something every day, then when you are through with the day's work, while your efforts may not be fully appreciated, the knowledge that you have that day helped humanity will make you feel that you belong to a profession that is really worth while.



EDITORIAL

The JOURNAL OF RADIOLGY

A Journal of Ideas and Ideals.

Subscriptions—In the United States, its possessions and Mexico, \$5.00 yearly; Canada, \$5.50; elsewhere, \$6.50 the year.

Advertising rates on application. All advertising must conform to American Medical Association Rules.

Payments for subscriptions and advertising must be made to Radiological Publishing Co., in New York or Chicago Exchange.

Address all communications to Business Office, 121 South Thirty-third Street, Omaha, Nebraska.

Published monthly at Omaha, Nebraska, by the Radiological Publishing Company.

A. F. TYLE, M. D.,
Managing Editor

ANNUAL MEETING

American College of Radiology and Physiotherapy

Chicago

November 10, 11, 12, 13, 14.

Hotel Sherman

Radiology and Physical Therapy.

The plan for coordination of all physical agencies in medicine seems to have met a popular reception, judging from the rapid growth of the American College of Radiology and Physiotherapy. Organized by a small group of interested workers in December, 1923, it has grown to a membership approaching 500. This membership is composed of the leaders in their respective communities all of whom are members in good standing of the American Medical Association. Many are Fellows of the American College of Surgeons, Fellows of the American College of Physicians and other societies and associations of equally high rank.

It would seem that the idea prevalent for so many years in the minds of some that physical methods had little place in medicine has been replaced by the idea that physical methods have a legitimate place in medicine. This place seems to be a large one when one stops to give the subject serious thought. Among physical methods of medicine one must include x-rays and radium, quartz light, radiant heat, infrared rays, ultraviolet rays, high frequency currents, sinusoidal, galvanic and faradic currents and mechanotherapy, hydrotherapy, massage, manipulation, and even surgery.

The employment of these agencies should be coupled with the same careful application of medical knowledge as is employed in the practice of medicine generally. When this is done together with correct application of psychology in the treatment of the sick, who can deny that the layman's need for the various cults has not been greatly reduced?

The same coordination of the physical agents employed in medicine is noted in the recent joint meeting of the Roentgen Society and the Electrotherapeutic Section of the Royal Society of Medicine. Sir Oliver J. Lodge, LL. D., D. Sc., F. R. C., is the president of the former and W. J. Turrell, M. D., is the president of the latter.

The intimate association of men informed in all lines of physical medicine will be helpful, will broaden vision and stimulate to better work. The annual meeting of the American College of Radiology and Physiotherapy will give an excellent opportunity for this intimate association of the American physicians.

The Roentgen Society and the Electrotherapeutic Section of the Royal Society of Medicine.

These two societies held a joint meeting July 5th at the Radcliffe Infirmary, Oxford. With two such well known leaders as Sir Oliver Lodge and W. J. Turrell one would expect this meeting to be one of the best ever held, and it was. Abstracts of the papers read will be given in the Abstract Department of the Journal as soon as they are available.

In England physiotherapy does not have to elbow its way, but way is respectfully made for it and it carries itself with confidence in its own worth, a worth long recognized in England by such workers as Robert Knox, President of the *British Association of Radiology and Physiotherapy*. Past-President of the Electrotherapeutic Section of the Royal Society of Medicine, Director of the Electrical and Radiotherapeutic Department of the Cancer Hospital, London, Honorable Radiologist King's College Hospital, Supervisor of the School of Instruction in Radiography, Radiotherapy and Electrology of King's College Hospital, etc., etc. W. J. Turrell is President of the Electrotherapeutics Section of the Royal Society of Medicine, Vice-President of the *British Association of Radiology and Physiotherapy*, Director of the Department of Electrology of the Radcliffe Infirmary, Oxford.

Other prominent men too numerous to chronicle are leaders in the field of physiotherapy in England, and the largest and best known hospitals as well as the smaller ones are proud of their equipment and their record in this field.

King's College Hospital gives this account of its routine activities in physiotherapy: "Closely related to the Orthopedic Department among other departments is the Physiotherapeutic Department, which is divided into Massage, Electrical and Remedial Exercise Sections. In the Massage Section patients suffering from injuries

EDITORIAL

(fractures, strains and sprains), arthritis and other diseases receive the necessary treatment. In the Electrical Section nervous diseases and injuries are treated by faradic, galvanic and the sinusoidal currents coupled with Diathermy. In the Remedial Exercise Section patients suffering with scoliosis, chronic nerve diseases and certain heart diseases are received for special treatment, consisting of exercises in great variety. Ex-Service men benefit from this Department and a special staff of highly trained masseuses are employed in giving the requisite treatment. Private patients continue to welcome the opportunity to obtain at fixed charges the services available in this Department. The fact that in this Department alone, including inpatients, casualty and outpatients, 40,000 treatments were given during the year will give some idea of the magnitude and importance of the work."

The Manchester Royal Infirmary since 1920 has had a medical officer in charge of the Electrical and Massage Department of the Hospital and conducts a very successful school of massage, medical gymnastics and medical electricity.

In an article written by Joseph E. G. Waddington, M. D., M. C., and published in the Journal of the Michigan State Medical Society for February, 1924, he has this to say in concluding his narrative of a trip through England and the Continent where he found physiotherapy given a large place in all the hospitals: "The physiotherapist needs no arguments as to the incalculable value of his specialty as an adjunct to medicine and surgery, but a visit to the clinics abroad serves to accentuate his beliefs and enthuse him the more to preach and spread the gospel of his specialty as a bridge whereon to convey suffering humanity to some measurable degree of well being."

George F. Thomas, M. D.

In the untimely death of Dr. George F. Thomas, the Radiological Society has lost one who had done much



toward the scientific advancement of roentgenology. He died very suddenly in his office on Thursday, May 29th, 1924, of angina pectoris the result of an erysipelas which had occurred 15 months previously.

Dr. Thomas was born in Akron, Ohio, April 12, 1882. He graduated from Western Reserve Medical School in 1906. While serving his internship in Charity Hospital he first became interested in roentgenology. In 1909 he began specializing in this work and shortly after this he became associated with Dr. Walter C. Hill, which association continued until the time of his death.

He was president of the Cleveland Radiological Society, President of the Pasteur Club of Cleveland, a member of the American Roentgen Ray Society, the Radiological Society of North America, the American Medical Association, and the Cleveland Academy of Medicine. For a number of years as a member of the Council of the latter body he had been an active figure in improving medical conditions in Cleveland. He was head of the Roentgenological Department of Western Reserve University and Visiting Roentgenologist to Cleveland City Hospital.

Dr. Thomas was a physician of farseeing vision and also a splendid organizer. His integrity in his work was of the highest, and his entire thought was given to this continually broadening field of roentgenology. He was never too tired nor too busy to give more time, more of himself and his work, and his unselfishness surrounded all, save himself. He had just reached the point in his career where he could give more time to writing, and during the past year had been devoting a great deal of time to compiling and analyzing statistics on the cases which had accumulated during his fifteen years in this work, and which under his able direction would have resulted in a work of great scientific value.

Dr. Thomas had the rare combination of a dominant personality together with a kindness of nature which gave him many staunch friendships. He was always an inspiration to his associates. The world is bigger because of him and his memory and personality will remain to inspire each of us to "carry on" in this his beloved and chosen field.

He is survived by his wife, two daughters and a son.

Medical News From the Far East.

A recent picture of a large gathering of Japanese physicians shows a group of dignified Japanese gentlemen clad in Western garb—not so! It shows a group of petite, pretty, bright faced, remarkably intelligent looking Japanese women, none of whom are old, because they are the daughters of a new day in the Orient. If one can judge from appearances these women are living life with a zest, finding it good, and they have great reason to find it so, for what Florence Nightingale was to the wounded warrior, these women are to their lay sisters. In the whole Orient it is estimated that there are 400,000,000 women to whom custom denies the services of a male physician—and only the Orient knows the tragedy thereby wrought.

The Occidental woman physician is welcomed and loved in the Orient but the woman physician of her own race is thrice welcomed and loved by the Oriental woman. Missionary women physicians have done heroic work in the field but the force has always been pitifully inadequate and it is well that their little yellow sisters have been inspired to follow in their professional footsteps.

There are about 700 native medical women in China, Japan, Korea and India. Many of these women have gained their degrees in the United States but an increasing number are taking their medical training in their

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own country. Not every Oriental woman who desires to study abroad can do so, and to meet this ever increasing demand during the last twenty years there have grown up a number of medical colleges for women there. There are three in China, two in India, and two in Tokyo, and there will be others.

Interesting stories can be told of all these but there is space to tell only of Japan, where lately, 1920, the Imperial University of Tokyo was authorized to admit women to all departments. One of the very first graduates is Madame Chiako Kodura, who finished her course this year and who wrote her thesis upon ultraviolet rays.

A number of graduates of the Japanese medical schools for women have their own hospitals in some of the largest cities of the country, many practice in government hospitals and laboratories, some work among the lepers, some in the Salvation Army hospitals, some are school physicians and some are visiting physicians.

Of those who have their own hospitals is Dr. Yayoi Yoshika, a pioneer Japanese woman physician who has been in practice for over twenty years but who still looks youthful. Her pictures show a true Japanese type, as we think of it, tiny, dainty, and with a rarely lovely face. Her intellect and her character speak in her achievements. She has established two hospitals in Tokyo, is head of the Tokyo Woman's College, and is President of the Japanese Medical Women's Association. From the medical school of which she is the head, 674 women have taken their medical degrees. There have been 20 Chinese and Koreans among this number, the others being Japanese. Some of these women are practicing in the hospital of the Imperial University where Dr. Yoshika says their opinions are looked upon with respect.

The Japanese Medical Women's Association has been in existence for nineteen years. It meets several times a year and its proceedings are published in its own bulletin. The program of one of its recent meetings is modern and full of interest and could take its place beside many a splendid program given in this country. In glancing over some of the articles one is struck with the mental calibre of these little Japanese women.

At the time of the recent earthquake in Tokyo it is said that the women physicians were leaders in the relief work and that before foreign help could reach them they and the other educated, modern women of the city had organized into a federation with certain duties assigned to certain groups. Their work was well done and proved of such practical benefit that these women have organized into The Tokyo Women's Federation, which has a number of different sections, each with its own constitution, officers and definite aims. Three of these sections have, at least indirectly, to do with the physical welfare of the country inasmuch as it depends upon the physical welfare of the woman. The Social Section aids needy mothers and little children as well as spreading health propaganda. The Labor Section is working toward im-

proved conditions for the women workers of Japan. The Political Section has the most difficult task and the farthest goal before it, for it is working toward the suppression of prostitution in Japan, and aims at the crippling of that other dragon, the war spirit.

What Others Think.

In a recent article in the *Journal of the American Medical Association*, Richard Kovacs, M. D., who is Supervisor of Physical Therapeutics, Reconstruction Hospital, New York City, quotes the following resolution drawn up at the International Congress of Military Surgeons which was held at Brussels in 1921: "Regarding the principles for fracture treatment learned by experience in the war, the congress emphasizes the primary importance of directing treatment from the first day with regard to the functional future of the limb, and of resorting in this behalf to physiotherapeutic measures, and especially to the earliest possible mobilization of the limb."

He also quotes from the *United States Medical Bulletin* of October, 1920, as follows: "The war has served to emphasize the great value of physical therapy and has proved that without its employment many physical disabilities caused by injuries or diseases could not have been treated so successfully. If, however, these principles are not applied to postbellum conditions, the lessons thus learned will have been more or less in vain."

Pennsylvania's Plan.

At a forthcoming meeting of the Pennsylvania State Medical Society, to be held at Reading, a rather unusual procedure is to be carried out, namely the physical examination by twenty of the leading medical men of the state of one hundred members of the Society who consider themselves to be in perfect health.

Examinations are to be strictly private and results confidential. The object is to create missionaries of preventive medicine who will go back to their communities and spread the gospel of the periodic physical examination of the apparently healthful individual.

Program Annual Meeting.

The program for the third annual meeting of the American College of Radiology and Physiotherapy is being arranged. Already many of the leading men in the profession have signified their willingness to appear on the program. In order to make the program as representative of the membership as possible it is desirable to have a large number of papers from the members. Send in titles at once to Dr. R. W. Fouts, Secretary, 121 S. 33rd St., Omaha, Nebraska.

Special railroad rates on the certificate plan have been arranged. Indications point to an attendance of about one thousand.

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Roentgen Ray Therapy of Poliomyelitis. HERMAN B. PHILIPS, M. D., and WALTER I. GALLAND, M. D. *Jour. A. M. A.* 82:1847-1850, June 7, 1924.

THIS is only a preliminary report, but the results are worthy of further investigation, the authors believe.

The effects have been studied in two distinct phases of poliomyelitis, namely in the residual paralysis, which did not yield to the usual forms of treatment and in the hyperesthetic cases following the acute case of the disease. All patients showed improvement and except for slight roentgen sickness none of the patients showed any deleterious effect from treatment. The authors state in their conclusions that they feel that roentgen ray therapy offers a method of shortening the period of hyperesthesia following the acute stage of poliomyelitis. Also they conclude that the roentgen rays offer a singularly safe and easily applied method of stimulating diseased but viable anterior horn cells in poliomyelitis in the stationary stage.

A Plastic Means of Protection for X-Ray Treatment. SIGFRID ARNELL, *Acta Radiologica.* 3:66-67, No. 11, 1924.

THE material used consists of one part paraffin with a melting point of 45 degrees C. and five parts of litharge. A layer of this 4.3 mm. thick, has a protective capacity equivalent to leadplate 1 mm. thick. It is used by the author to facilitate the isolation of irregularly formed surfaces, e. g., warts or carcinoids. The mixture is rolled out to about one centimeter's thickness, applied to the skin and pressed hard against it where the wart is, in order to make an impression or guide; then the mixture is lifted off and a place for each wart is made with a knife wherever the impression shows. After replacing the layer over the skin, the holes are given a final adjustment if necessary.

Consideration of Assumed Causes of Roentgen Ray Intoxication and Injuries. B. F. SCHREINER, M. D., F. A. C. S., and K. W. STENSTROM, Ph. D., *Am. J. Roentgenol.* 11: 451-454, May, 1924.

WITHOUT a record of percentage depth dose, there is little of value to radiation therapy in experimental data obtained from animals subjected to roentgen ray treatments. So-called radiation sickness is not explained on the basis of injury to intestinal epithelium alone. The amount of roentgen ray absorbed in the body can be used as a clinical guide in these sicknesses, unless certain glands are radiated (adrenals and ovaries, perhaps the thyroid), and external radiation in large doses often stirs up latent salpingitis. It is absolutely essential to work with standardized roentgen ray machines and roentgen ray charts showing the distribution of energy. From the authors' experience with 1000 cases treated with high voltage roentgen ray, when these factors were adhered to, they believe the sickness is lessened, though headache, nausea and vomiting were present in many cases.

Blood Anomalies in Radiologists and in Persons Employed in Radiological Service. P. AMUNDSEN, *Acta Radiologica.* 3:1-7, No. 11, 1924.

IN SPITE of the universally employed means of protection, such as lead, glass, rubber, etc., there is always a certain amount of harm done all those who are employed in any way about the laboratory. This study proves that even those working in the vicinity of radium for only a short time each day are affected by it. For instance, the photographer who was employed to take pictures of the patients, and the maids employed for a short time each day in the laboratory were typically affected.

The blood effects were the principal ones noted. It was found that the absolute number of white cells was often less than normal average, the change being most marked in the

ratio of the polynuclear leukocytes and the lymphocytes, a reduced percentage of leukocytes and an increased percentage of lymphocytes (relative lymphocytosis). The percentage of hemoglobin has nearly always been found normal. The effect on the blood is observed even after only one or two months of radiological work. The author believes that all laboratories should look over their protective devices from time to time to assure their perfect condition.

Calcification of the Pericardium. Report of a Case Discovered Roentgenologically During Life. JOHN B. YOUNANS, M. D., E. FORREST MERRILL, M. D. *Jour. A. M. A.* 82:1833-1840, June 7, 1924.

SWARTZ, in the *Wiener klinische Wochenschrift* for Dec. 15, 1910, reported the first case of calcification of the pericardium discovered roentgenologically during life. Since then eleven cases have been reported, two during the last year and the authors add another one in this report, making 13 in all. Suspected cases should be studied very carefully by fluoroscopic methods, and several films should be made at different angles, using the shortest possible exposures so that the calcified area will stand out clearly. In using the fluoroscope one should remember that the observer must allow plenty of time for eye accommodation before making the examination. There are all stages of calcification from a few calcified plaques to an entire wall in extreme cases.

The Relative Value of Percussion and X-Ray in Cardiology. A. E. FOSSIER, M. D. *New Orleans M. & S. J.*, 76:537-541, June, 1924.

THE author ascribes very little value to the x-ray in cardiology. In the discussion following this paper, Dr. Leon J. Menville disagreed with the author as to the value of the x-ray for this purpose, citing the opinions of others to sustain his points.

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In Defense of the Rights of Authorship of Some Fundamental Rules of X-Ray Technique and Accessories. PROF. DR. A. CIESZYNISKI, Lwow, Poland. *Dental Cosmos*, 66:656-664, June, 1924.

THIS is a defense written by the author who claims that certain writers have usurped discoveries of his. He specifically mentions (I) *The Rule of Isometry*, which he says is wrongly ascribed to Dieck; (II) *Certain Rules of Interpretation* regarding (a) indication of the base of the antrum of Highmore and the typography of the molar roots, (b) method of controlling root filling, (c) topographical indications of periapical bone cavities, abscesses, cysts, granulomas and impacted teeth; (III) *Simplified Exact Typical Intraoral and Extraoral Technique*. He also claims that several filmholders said to be original with those after whom they are named are merely modifications of his own much earlier invention. He charges the direct misuse of unpublished information given out privately by himself and deplores such an occurrence in the scientific world.

Effect of Radium on Glaucoma. J. J. CORBETT, M. D., Boston M. & S. J., 190:1124-1126, June 26, 1924.

THE author believes that the action of radium on intra-ocular tension in glaucoma suggests a field worthy of investigation. In some cases radium treatment definitely lowers the intra-ocular tension and this effect is sometimes followed by an improvement in vision. It is by no means intended to give the impression that other measures need not be employed. Radium is an additional aid, or appears to have been, in the few cases reported.

Radiographic Differentiation of the Dilatation of the Renal Cavities. P. SMYRNIOTIS, M. D., and F. KRAFT, M. D., *Acta Radiologica*, 3:29-39, No. 11, 1924.

TO GIVE an exact nomenclature for the different parts of the renal cavities the authors suggest "ampulla" for the so-called anatomical pelvis of the kidney and "pelvis" for both the ampullae and the calices.

The normal pelvis is classified into two types, one without ampullae and one with them. The latter type has three forms, of which the first has long calices uniting in a relatively small ampulla, the calices having several branches, as a rule two or three; the second form has an ampulla much larger than the form just described and the calices are very short, the ampullae relatively small.

This may lead to confusion of a normal form with one dilated, and strict attention to clinical symptoms is the means of differentiation to rely on here. The third form shows short calices in general, but right at the top there will be one very long one. As to the capacity of the renal cavities one must remember that this cannot be estimated with mathematical exactness, much depends upon the configuration and upon the sensitivity of the patient.

Dilatation of the pelvis may be caused by retention of the urine or by an infection. If caused by retention of urine, there will be three periods (1) of dilatation of the ampulla, (2) dilatation of ampulla and calices, (3) enormous dilatation of the pelvis with great atrophy of the renal tissue.

In the first period there will be an increased capacity up to 20 to 30 c.c. according to Voeleker. The calices are relatively small and show no alteration and the contour of the entire pelvis is very distinct.

In the second period there will show a much dilated ampulla and the calices will show considerable dilatation and though sometimes they will show their original form, they may present a rounded or ovoid form. The spaces between them are very small and the parenchyma begins to show atrophy. The capacity is correspondingly increased according to the degree of dilatation.

In the third stage there is a still greater change. The renal pyramids are no longer to be distinguished, the ampullae and the calices form one big sac with distinctly sharp outlines, although in the region of the parenchyma they may be more or less flowing. To name and describe the many diverse pictures would not be possible in this short article.

The second cause of dilatation, infection, may destroy the calices, the contours being either quite irregular or else effaced entirely. There is no manifest dilatation and the capacity is normal. In the second period the contours are irregular or effaced and the calices appear much more dilated. In the third there is destruction with dilatation of the pelvis, but the character of the destruction differs from that of the first stage as in some places it will show regular and proportional outlines and in another place the outlines will be neither definite nor regular.

Technique: The author takes it for granted that the general technique is understood, but he adds several points from his own particular technique. To avoid flatulence, a foil to good picturization, he advises an

enema shortly before the plate is to be taken. He never begins the process of pyelography until assured by his assistant that the pelvis is empty of urine (unless in the case of a stenosis being present, which does not permit the sound to be passed). The quantity of opaque enema injected will then measure the capacity of the pelvis. Injection should be done gently and slowly and should be interrupted upon encountering any resistance. At the moment when the patient detects pain in the lumbar region the plate is taken quickly just at the instant between inspiration and expiration, the abdomen being slightly compressed but not enough to cause any lessened volume of the opaque injection. Often a second plate is made in a sitting posture in order to determine whether there is a stenosis of the ureter or a ptosis of the kidney. Previous to injection an ordinary photograph is taken from whatever angle the nature of the case may require.

X-Ray Diagnosis in Diseases of the Genito-Urinary Tract. NELIUS J. NESSA, M. D. *Urologic and Cutaneous Rev.*, 28:334-341, June, 1924.

THE roentgen ray is of prime importance in the study of diseases of the genito-urinary tract, but it must be looked upon as an adjunctive measure to be employed together with the history, cystoscopy and laboratory findings.

Sometimes satisfactory diagnostic roentgenograms can be made without any special preparation of the patient, but it is better to make preparation by the administration of a non-gas or liquid forming cathartic on two successive days prior to examination. Compound licorice powder and castor oil are recommended, although the author prefers the former. The patient must remove his clothing to the waist line, though a cotton gown is furnished patients, and when he is placed upon the radiographic table the other clothing is pulled out of the way so as not to interfere with the areas to be examined. The knees are placed in flexion to cause an extension of the lumbar spine and to bring the kidney areas nearer to the films, this will make their outlines appear more sharply on the plate.

Compression over the areas rayed by means of an air bag and band with use of the 11 by 14 films to cover the upper and lower half of the genito-urinary location is quite sufficient. A large film can be used to cover the whole genito-urinary area with good detail on one or two roentgenograms. The stereoradiographs

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grams are, of course, more satisfactory.

Normally the kidneys are rather fixed and show only about one centimeter excursion in changing the body position from vertical to supine. They lie opposite the twelfth dorsal and first and second lumbar vertebrae, close to the psoas muscle margin, measure from 10 to 13 cm. in length and are crossed by the eleventh and twelfth ribs.

An enlarged kidney outline may not be of diagnostic value, for it can be produced by distortion, or it may represent the kidney of a large patient, or may result from disease of the other kidney. On the other hand, a normally sized organ may be decidedly pathological.

Changes in shape from the normal outline may be suggestive of tumor growth, cyst, infection or purely anatomical variation.

Oxalate stones will give a very dense shadow, phosphatic stones a less dense one and the urate stones are practically invisible. The latter are usually found in the bladder. A negative report of lithiasis is not conclusive proof that none exists.

The kidney stone is frequently triangular in shape and shows a single shadow, but often a single shadow is due to multiple shadows superimposed.

A kidney stone shows less distortion and better detail in the antero-posterior view than does a small gall stone and vice versa. Also a gall stone is apt to be denser at the periphery and show a greater amount of excursion. If the lateral view is successful in demonstrating a shadow, a renal calculus is indicated if the shadow is in the posterior half of the body, and if in the anterior half, gall stone is indicated.

Calcified lymph glands are usually located along the root of the mesentery in line with the left kidney to a point corresponding to the right sacro-iliac joint. They are also in the region of the iliac vessels, appear grainy and their position is more or less shifting.

If one kidney is distinct and the other more or less blurred, then one should consider a peri-renal abscess.

Ureteral calculi are usually oval, rough or smooth, resting with the long axis parallel to the ureter as a rule. The normal constricting points in the ureter are the uretero-pelvic, crossing of the iliac vessels, just outside the bladder and papilla within the bladder.

Most frequently a calculus is located in the uretero-pelvic area, or just outside the bladder. Underlying bone shadows of the sacrum may ob-

scure them and confusing shadows may be produced by hypertrophic bone changes in the spine and pelvis, arteriosclerosis, calcified areas in fibroid ovaries and dermoids and phleboliths. The last named are usually located below and external to the tip of the ischial spine. They are calcified thrombi on the distal side of the valves in the vein plexus of pelvic cellular tissue about the bladder and rectum and are troublesome to diagnose. Differential diagnosis can be made by passing a ureteral catheter before making a double exposure with a transverse shift of the tube or turning of the target so as to change the angle or even to turn the patient between the two exposures. If the catheter is in contact with the suspected area in the different views the likely diagnosis would be ureteral stone, otherwise it would be an extra-ureteral location. Or diagnosis may be accomplished by injecting the ureter with a 25 per cent solution of sodium bromide and if a superimposed shadow occurs in all positions, diagnosis for ureteral stone will be positive. The same diagnosis holds if the catheter stops abruptly at the point of a suspected stone shadow.

Prostatic calculi are usually small and multiple and should be rayed in the posterior anterior position for close apposition to the film. They may be mistaken for urinary calculi.

Hydronephrosis can be demonstrated by the injection of shadow producing solution into the kidney pelvis, thereby revealing a widening and dilatation of the same as well as the calices and proximal ureter. Of course, a knowledge of the normal pyelogram is necessary to know the abnormal.

Roentgenographic evidence of renal tuberculosis usually is identified by irregularity of outline variability in density of shadows, small shadows either multiple or grouped and large shadows outlining the renal lobulation over the entire kidney. It is difficult to differentiate the condition from lithiasis and it is ordinarily impossible to do so without the aid of the pyelogram and cystoscope. Tuberculosis of the kidney would be suspected when the outline is irregular with calcified areas or so-called mottling. The outline of the organ may be enlarged and the pyelogram will usually show lengthening of the kidney and pronounced dilatation of the tubes or a moth eaten appearance with the solution encroaching or permeating the cortex. Tuberculosis of the ureter should be suspected when the ureterogram is dilated after injection of the bladder for cystogram.

It may extend to the kidney pelvis

and is usually unilateral and noted in cases where it has been found impossible to pass a urinary catheter. In children there may be, normally, a filling of the ureter after making a cystogram; unless the outline of the ureter furnishes definite evidence of pathology there is no need to be concerned.

Intrinsic and extrinsic kidney tumor cannot be differentiated roentgenologically because extrarenal and parenchymal tumors may cause deformities in the pelvis or calices that can be outlined by a pyelogram and found similar in all respects. A pyelogram showing irregular loss of calices and a distorted pelvis may be due to incomplete filling, tumor or cortex growth. The characteristic picture for kidney tumor is an irregular prolonged extension of one or more calices to a point beyond the usual limits in a normal kidney. If the whole kidney is involved the pelvis may be reduced to a small mass with irregular strands of shadows produced by the shadow-producing solution, something like a spider web. Polycystic kidney usually shows a similar picture with enlargement of the kidney shadow, but the strands in the pelvis are less irregular and the margin more rounded due to the globular cystic pressures exerted. The ureter may be found long and curving over an enlarged kidney pole, and may extend medially within the shadow of the spine.

Tumor of the bladder and hypertrophy of the prostate will show up by filling defects if the tumor is of sufficient size.

Diverticulum of the bladder shows up as an offshoot or accessory pocket to the bladder, and is usually connected by a narrow lumen. Diverticula may appear singly or may be multiple. If they are suspected, the routine radiographic examination should be made in the direct and oblique positions so as to be able to locate them if situated otherwise than on the lateral walls.

Ureteral abnormalities, such as multiplicity, dilatation, kinks and angulations may be roentgenologically demonstrated by means of leaded catheters or injection of opaque solutions.

Routine Roentgen Examination of the Chest in Diseases of the Genito-Urinary Tract. HARRY B. PODLASKY, M. D., Urologic and Cutaneous Rev., 28:331-333, June, 1924.

A ROUTINE chest examination is as necessary in these cases as is a routine Wassermann. The author insists upon this. A chest ex-

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amination will at times reveal acute or chronic tuberculosis long before the microscope or animal inoculation will disclose the fact that tuberculosis of the genito-urinary tract exists.

In case of vague urological symptomatology with perhaps one outstanding finding such as hemoptysis, a careful roentgen examination of the chest will, of course, be requested. The findings may be difficult to analyze in some cases. The ease with which malignancy may be determined depends upon the form of metastasis, i. e., the nodular or infiltrating type. It is common knowledge that prostatic malignancy shows metastasis in the lumbar vertebrae, innominate bones and chest, yet chest examinations are frequently neglected. It is not, however, the contention of the author that a routine examination of the chest is always successful in making a positive diagnosis, but it often leads to a knowledge of the nature of the condition and to correct interpretation of vague symptomatology.

The Value of the Roentgen Ray in the Diagnosis of Gall Stones. LEON J. MENVILLE, M. D., New Orleans M. & S. J., 76:542-543, June, 1924.

FROM 30 to 40 per cent of positive diagnoses are now being reported by the x-ray. A negative x-ray finding is valueless. The shadow cast by gall stones is dependent upon their absorability rate, the higher the rate, the denser the shadow.

Renal Stones Permeable to the X-Ray. JOHN M. CULLIGAN, Jour. Urol., 11:559-564, June, 1924.

SHADOWLESS renal stones are usually composed of pure cystin, xanthin or uric acid. Stones of such composition may produce shadows if other salts are mixed with them or if their structural arrangement is favorable. Shadowless renal and ureteral stones can be diagnosed by areas of greater translucency in the pyelogram or the ureterogram. Stones that do not cast shadows in the roentgenogram will not usually be visible when the kidney is fluoroscoped after it is delivered through the incision. It may be advisable to perform nephrectomy in these cases when doubt exists concerning remaining fragments of stone.

Artificial Light Therapy in Tuberculosis. EDGAR MAYER, M. D., Jour. A. M. A., 82:1920-1923, June 14, 1924.

THIS article has been written chiefly to hint at future possibilities of light therapy. Reliance upon its

use is not encouraged in pulmonary tuberculosis, but it is particularly advocated as an adjunct in such complications of tuberculosis as bone and joint, peritoneal, fistulas and glandular lesions.

To the Question of Postoperative Treatment of Mammary Cancer. T. LARSEN and ERIK LYSHOLM, Acta Radiologica, 3:8-13, No. 11, 1924.

A REVIEW is given of the literature published by Perthes and others on the results of the preventive postoperative treatment of mammary cancer. The authors then present the results in 109 cases of such treatment under Dr. Forssell. Their report is thus summarized:

Seventy-six cases, all under observation for at least three years, have been treated with several series of small doses delivered through a filter of 4 mm. Al. Of these 76 patients, 47 (60 per cent) are still alive and have had no provable recurrence; of 26 cases with a local non-adherent tumor, all have been without recurrence; of 35 with adherent tumors or axillary glands 24 (68 per cent) have been free from recurrence; of 15 cases with glands in the supraclavicular fossa only one has had no recurrence; out of the 33 cases irradiated with large single doses (1920) and deep therapy, only 16 cases were alive and without recurrence after one year, and in all groups there has been a higher frequency of recurrence by this technique than by a series of smaller doses. Therefore this method has been abandoned.

The Roentgen Ray in the Treatment of Carbuncles and Other Infections. FRED M. HODGES, M. D., Am. J. Roentgenol., 11:442-445, May, 1924.

DURING the past year and one-half the author has treated nine cases of large and extensive, ulcerating and sloughing carbuncles, in one of which the outcome was frankly expected to be fatal unless x-ray treatment could save the patient. Results in all cases were very happy ones and in only one case was there any extension of the pathology following radiation. This was a case where the carbuncle was so near the parotid that for fear of a parotid reaction too small a dose of the ray was used. The author says that he does not believe that every case of carbuncle would respond as beautifully as did these nine cases, but from his experience he concludes that: (1). Every carbuncle should

have roentgen therapy as soon as the diagnosis is made. (2). When softening first occurs a small incision should be made. (3). The pain is greatly relieved in nearly all cases and entirely relieved in many. (4). The infection is usually limited and the duration of the disease is shortened. (5). There is very little scarring following this method of treatment and no danger or pain associated with the radiation itself. (6). Other localized infections of the skin and subcutaneous tissues respond very similarly to the roentgen ray. (7). Areas of lymphangitis extending for some distance away from the localized lesion usually disappear a few hours after the treatment.

The technique used was: 4 ma.; 9 inch spark gap; 8 min.; 9 mm. Al; 9 inch distance; half this dose repeated about the fourth day if necessary. The area treated included one inch, at least, of healthy skin around the lesion. As soon as any part of the indurated area showed any softening, a small incision was made. The discharging sinus or sinuses were dressed daily but no lotions of any kind were applied.

Urticaria Pigmentosa in Adults Treated by the Roentgen Ray. JEFFREY C. MICHAEL, M. D., Arch Dermat. & Syph., 9: 746-751, June, 1924.

ONE case has been reported by Fox, and MacKee refers to a case reported by Toeroek and Scheim and to one by Jacob which are treated by roentgen ray therapy. The author adds a case from his own practice. The case cleared up completely for a time, but at present, one year after treatment, the lesions are returning. In the other three cases the rays were successful only at first in one case but apparently produced a lasting cure in the others.

Precision in Dermatologic Roentgen Therapy. LYLE B. KINGERY, M. D., Arch. Dermat. & Syph., 9:738-746, June 9, 1924.

THE author attributes the alternating periods of pessimism and optimism through which the roentgen ray has passed to the relative accuracy of different methods of control in vogue at different times. Because of mechanical imperfections the method of predicting the extent of the biologic effects by a proper estimation of the factors of ma., spark gap, etc., was displaced for a time by photographic and chemical procedures. It was soon found, however, that this method required a personal expertise of judgment as to color

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changes which made the method unreliable as a test of accurate dosage. With a greater perfection in apparatus the older method again assumed the place of choice, it leaves little to be desired and finds easy and practical application in ordinary routine. The author believes that technical details of construction, and not present methods of dosage estimation, offer the explanation for what are at times disappointing results. The sphere gap and the stabilizer eliminate variations in dosage factors, to a large extent.

Sycosis Vulgaris and Radium. R. R. DUCASSE, M. D., Ohio M. J., 20: 357-358, June, 1924.

THE author reports a case of six years' duration. It was an unusually severe sycosis of the upper lip and had been treated by ointment, epilation, vaccines, nasal operations and roentgen rays. The latter had produced temporary relief but upon a return of the sycosis further treatment had been useless. Radium was determined upon and four applications were necessary. They were followed by the usual reaction but the clearing has been maintained for two and one-half years despite frequent exacerbations of the nasal infection.

A rectangular applicator was used, approximating the so-called half strength type. It was screened by a 0.3 mm. shield and a rubber dam. Adhesive was used to maintain the plaque in position where it was left for five and one-half hours. A square half-strength applicator may be used instead but it should not be applied for longer than four hours.

As to sequelae, no telangiectases were noted. Disturbances in pigmentation may occur in the brunette type. Cicatricial changes are a frequent sequel of persistent sycosis but are minimized by the use of radium. Unless already a prominent feature its production by the use of radium need not be feared. A permanent hair loss must be expected and this should be explained to the patient before treatment is entered upon.

Radium Therapy of the Thyroid. FRANK M. HAGANS, M. D., Endocrinology, 8:404-408, May, 1924.

THE author divides the different types of goiter into two main groups: (1) Cases with hyperthyroidism wherein are included the exophthalmic type, hyperthyroidism with goiter and hyperthyroidism without goiter. (2) Cases without hyperthyroidism, wherein are included the cystic, colloid, simple, adolescent, malignant and intrathoracic types.

The cases in the first group may be treated with radium but those in the second group should never be so treated, as treatment will do no good and may do much harm. The benefit to cases in the first group depends upon the ability of the radium rays to produce an inhibition or an abolition of the secretory function of the gland or even the complete destruction of the secreting cells themselves. Treatment is indicated where there is an excessive secretion from the thyroid. In the second group a state of atrophy of the normal gland is produced, resulting in hypothyroidism.

The gland, at most, is not reduced completely after radiation, since the secretory cells are partially replaced by fibrous tissue. A reduction of about two and one-half inches in the neck circumference is average.

The metabolism test is very important. The metabolic rate within a radius of normal is given as no more than 15 plus or less than 15 minus. The blood picture should be watched also.

Technique: The neck is blocked into four squares, one over each lobe, one over the thymus, one over the isthmus. Usually 100 milligrams of radium are used. The radium element is encased in silver tubes of 0.5 mm. wall thickness, and is screened with 1.0 mm. brass with 2 to 3 mm. rubber and is mounted on a block of wood about one inch thick. This is held in place for four hours over each square. This is tried out as a feeler and if the case seems rather immune to radium then the dosage is increased over each lobe area. At least one-half lethal dose should be given.

If there is no marked improvement within three months' radiation the case should be referred to the surgeon. If the case is slightly improved but not well, radiation should be continued at long intervals and medical and hygienic treatment persisted in until the patient becomes normal.

The Roentgen Treatment of Toxic Goiter. EDWARD W. ROWE, M. D., Endocrinology, 8:389-402, May, 1924.

CLINICAL observation and records of basal metabolism indicate that properly selected cases are as rationally treated by roentgen ray as by surgery. In roentgen ray treatment the general management of the patient is as important as it is in surgery. A longer time may be required for treatment but there is no mortality, no scar and no fear.

Adenoma with toxicity yields more quickly to surgery but roentgen treatment often gives brilliant results. Exophthalmic goiter shows the best results of all types and if the roentgen treatment is faithfully carried out surgery is seldom necessary and the results are as good as with surgery. The treatment of toxic goiter is "major roentgenological work" and requires broad medical experience. The estimation of the basal metabolic rate is necessary to accurately determine the degree of toxicity and to visualize the progress of the disease. There will first be noted a reduction of pulse rate, an increase in weight and lessened nervousness and insomnia. The exophthalmos will eventually disappear in about 50 per cent of cases and it improves in most cases. Thyroid enlargement is one of the last objective signs to disappear. The end-results depend directly upon the damage when the hyperthyroidism has disappeared. A complete cure cannot be expected when degeneration of heart muscle and nephritis have been part of the history. There must be a follow-up of each case to secure the best results, and rest, psychic control, diet and eradication of focal infection are a necessary part of the treatment.

Studies on the Physical Foundations of Roentgen Ray Therapy. HUGO FRICKE, Ph. D., and OTTO GLASSER, Ph. D., Am. J. Roentgenol., 11:435-442, May, 1924.

THE problems in this study were (1) to find the influence of variation in focal skin distance, filter and area of field, on the surface and the depth doses for certain conditions of radiation; (2) to measure a set of isodoses; (3) to determine the right combination of filter and focal distance to obtain the maximal deep effect for a fixed surface dose. The determination of the influence on the ionization current of the variations in the shape, size and material of small ionization chambers was also part of the problem the results of this to be published later on.

Dessauer's deep curves are quite different from Friedrich's as they give much higher deep intensities for the same working conditions and are also of a very different form. Dessauer and Vierheller used a photographic method. Friedrich an ionization chamber, hence in their studies the authors repeated these measurements using a typical American roentgen ray transformer. Their values for deep effects are in fairly close agreement with Friedrich's also Glocker's but the results are in sharp disagreement with those of Dessauer.

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This article has the following headings which are discussed in the order given: experimental technique; surface intensity in terms of focal distance, thickness of filter and area of field; determination of isodoses; deep effect in terms of focal distance, thickness of filter and area of field; choice of right combination of filter and focal distance. A bibliography of 20 references is appended.

Palliative Doses of Roentgen Ray in Advanced Cancer. EUGENE T. LEDDY, M. D., and JAMES L. WEATHERWAX, M. A., Am. J. Roentgenol. 11:429-435, May, 1924.

A brief review of the literature upon this subject is presented together with six case reports. The authors' conclusions are: "Inasmuch as 'erythema', 'carcinoma' and 'sarcoma' doses have no absolute value, dosimetry on a basis of these is an arbitrary technique. In advanced cancer, radiation with the technique of fractional doses applied at intervals has given satisfactory results. The supposition is advanced that in more favorable cases of carcinoma a similar technique may be as effective as more intensive radical therapy."

High Voltage X-Rays in Cancer. JOHN F. McCULLOUGH, M. D., Atlantic M. J. 27:469-474, May, 1924.

PRECEEDING the new high voltage therapy, success depended upon (1) The quality of x-rays emitted; (2) the quantity; (3) time of exposure to the rays; (4) distance of the tube from the part; (5) amount of filtration; (6) size and number of the ports of entry. These are still cardinal points and demand closer attention when one is using the new apparatus than they formerly did with the old. Also a more accurate determination of the quality and the quantity of the rays is necessary but as yet the question of dosage is in the process of development for practical use. Iontoquantimeters intensimeters and like delicate pieces of mechanism are not practical in the hands of the average doctor as they are easily deranged and this leads to error if not disaster.

There is also the problem of the biological, anatomical, and physiological factors which play a large part in the estimation of dosage. The radiologist must ask himself regarding each malignant growth: "How sensitive may it be to radiation? How extensive is the involvement? Can it be radiated without impari-

ment of the resistance of the surrounding tissues? Will the neighboring organs be affected so as to impair their normal function? Will the necessary amount disturb the endocrine system?"

In the discussion of this paper Dr. G. W. Grier said it was unfortunate that high voltage treatment and the one-dose method came into vogue about the same time because it has led to confusion, as the two principles are entirely different. High voltage currents produce rays of a great penetration and the only way that these differ from the x-rays is that they go deeper into the tissues. They are simply x-rays. If inaccessibility is the only reason why a growth is incurable, then the high voltage treatment is a great advance over the older forms of treatment, but if it is incurable for any other reason (metastasis, toxemia, in a vital organ, etc.), then the effect will be the same. As to the one-dose treatment, Wintz conceived the idea of delivering enough x-ray to the cancer at one time to destroy it but this dose will often destroy the patient also. Dr. Grier believes that repeated doses with the high voltage method, as much as the normal tissue will stand, will produce retrogressive changes in the cancerous growth and increase the resistance of the normal surrounding tissue, surrounding the growth by a barrier of fibrous tissue.

Report of the Committee on Mechanical Vibration. MARY H. L. ARNOLD SNOW, M. D., Am. J. Electroth. & Radiol. 42:159-168, May, 1924.

THE author says that a more careful study of postural blood pressure and pulse pressure relationship would assist in determining prognosis and treatment. A comparative study of the velocity of the blood in connection with that of systolic, diastolic and pulse pressure, as well as of pulse rate, will assist in standardizing treatment. A reversed blood pressure postural relationship, associated with hypertension is corrected or aided by a five minute vibratory treatment from the second to the sixth dorsal vertebra from above downward and alternately from side to side. A reversed blood pressure postural relationship, if associated with low blood pressure, is, as a rule, when primary, probably best treated by a two minute vibratory treatment between the seventh cervical and first dorsal vertebrae with the ball vibratode, exceptions are generally amenable to a vibratory treatment as indicated in the

previous sentence. Hypertension without systolic disparity, when not occurring secondarily with valvular disease with nephritis, is usually reduced by a five minute vibratory treatment between the second and third, and third and fourth dorsal vertebrae. Hypotension when primary is treated with palliation or symptomatic cure by inducing the cardiac reflex of contraction through toning up the heart by a two minute vibratory treatment with the ball electrode between the seventh cervical and first dorsal vertebrae. Bishop notes that in primary low arterial tension the heart muscle is in a position to recover its tone if depleted by acute disease, or to develop a compensatory hypertrophy if overtaxed by defective valves.

Report of the Committee on Thermotherapy. BYRON SPRAGUE PRICE, M. D., Am. J. Electroth. & Radiol. 42:155-159, May, 1924.

THE principles underlying the application of heat are too often entirely unknown to those practicing thermotherapy. The various forms of thermotherapy constitute "popular and rather comfortable lethal weapons in the hands of the unqualified at the sacrifice of health and life." Arterial inelasticity, sclerosis and nervous exhaustion are often produced through these faulty procedures. The definite object of treatment should be founded upon a physiologic basis and not on chance. Dependent upon the form of apparatus used and upon technique, there is a wide range of results to be secured from thermotherapy. The principles of the application of the various forms are discussed.

The Endotherm. GEO. A. WEYTH, M. D., Am. J. Electroth. & Radiol. 42: 186-187, May, 1924.

THE endotherm knife has been devised and perfected to produce endothermy which is the localized production from within in response to the many oscillations of a high frequency current, and is used in surgery for its destructive action on malignant tissue. The endotherm knife must not be depended upon for the destruction of malignancy. It supplements but is not a substitute for either monopolar or bipolar endothermy.

It is always executed by a sharp pointed active electrode which is cold when applied. This is in contradistinction to the Paquelin cautery, cold cautery or the galvano cautery where heat comes from without.

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The endotherm knife must not be relied upon for the destruction of malignancy. It supplements but is not a substitute for either monopolar or bipolar endotherapy. Monopolar diathermy is used for the destruction of the smaller and more superficial lesions and bipolar diathermy is used for the larger growths involving deeper tissues.

The paper discusses the physics and to some extent the technique of these modalities.

Heliotherapy in Surgical Diseases.

OSCAR S. BROWN, M. D., Southwestern Med. 8:215-218, May, 1924.

HELIOTHERAPY as here used refers to treatment by natural sunlight. The Romans knew the value of such treatment and on the Continent its value is understood better than it is in the United States. The Swiss, German and French have secured wonderful results from the therapeutic use of sunlight in surgical tuberculosis. In tuberculosis of the abdominal cavity there is wonderful improvement after opening the abdomen and allowing the sunlight to shine in for a short time. Sluggish burns are helped to heal by the same agency. The author submits four very interesting case reports, one of a badly burned patient, one of a case of leg ulcer, one of tuberculosis of the hip joint and one of tuberculosis of the intestines. Sun baths in combination with other treatment seemingly produced remarkable results.

Treatment of Acne Vulgaris. OSCAR L. LEVIN, M. D., Med. J. & Record. 119:136-139, June, 1924.

THE use of the x-rays marks a memorable advance in the treatment of acne vulgaris. At present it is possible to tell patients that with proper supervision of the general condition and the local use of the x-rays a cure can be attained in 98 per cent of cases. There is no danger from the treatment if properly applied.

The apparatus includes any standard interrupterless transformer with perfect meters and a Coolidge tube. Fractional doses of x-ray are given by the method of indirect measurement.

The patient reclines, face turned to one side. The scalp, ears, eyes and eyebrows are covered with lead foil, and the chest and neck with lead rubber. The tube is then brought toward the face and inclined so that the anode is at right angles to an imaginary line drawn through the outer part of the zygoma. The dis-

tance between anode and skin is usually eight inches. One-quarter of a skin unit of unfiltered rays is given to both sides and finally one-eighth of a skin unit is given the middle of the face; this last exposure should be given even in absence of lesions on forehead, nose and chin. If the back is affected each half is given one-quarter of a skin unit. The shoulders and arms are protected at the same time but precautions are taken to shield untreated regions. The same procedure is followed for treatment of the chest.

Exposures are given once weekly for twelve to sixteen weeks. No effect may be noted for a week and sometimes the lesions seem to become more active after the first two or three exposures, but this increased inflammatory reaction rapidly subsides and as a rule not more than sixteen treatments are needed but the course may be prolonged until the twentieth week, especially if the skin continues greasy. The presence or absence of grease is something to be noted carefully and if the skin seems excessively dry the number of exposures should be reduced. The dryness will not be permanent.

X-rays neither cause nor increase scarring which is usually the result of old comedones or deeper lesions and can be avoided by early treatment. Neither is hypertrichosis caused by the rays but when present is an accompanying condition and associated with an endocrine disorder. Telangiectasia are never observed and atrophy is very rare when proper technique is employed. It will be first evidenced by a fine wrinkling on cheeks and chin near the corners of the mouth and treatment should be discontinued at once.

Best results are secured in the indurated cases and the rare failure is in the punctate type. In this last type a strong sulphur lotion or a bethanaphthol ointment combined with mechanical expression of the blackheads should be tried. In acneiform dermatitis the gastro-intestinal condition should be corrected, the intestinal fermentation removed and the gastric acidity reduced.

The rays should not be employed promiscuously. The man who uses them should be able to interpret the clinical symptoms in terms of their microscopic pathology and the operator should possess an exact technique and knowledge of the microscopic changes produced by the rays on the structure of normal and abnormal skin. Radium has been used with success but it has no advantages and it is not practical nor convenient.

Local use of, or exposure to, any irritant must be forbidden. The rays must never be used subsequently to the application of an irritant for at least a fortnight. Alcohol, witch-hazel, tar, sulphur, salicylic acid, resorcin and all keratolytics are interdicted for local use. Mild soaps, zinc oxide ointment, calamine and zinc oxide lotion may be used. A weak solution of phenol may be added for antiseptic antipruritic effect. The affected parts should be washed frequently with cold water and a neutral soap and the blackheads expressed gently without injury to the surrounding skin. Seborrheic eczema complicates nearly every case and this should be treated. In applying antiseborrheic and stimulating applications to the scalp care should be taken not to irritate the face. Subsequent to the cessation of radiotherapy a calamine and zinc lotion may be dabbed daily on the face and if an oily condition persists a mild sulphur lotion may be begun after one month.

For other methods of local treatment and constitutional methods the reader is referred to a paper by the author which appeared in the New York Medical Journal in December, 1919.

The Fractional Dose Method in the X-Ray Treatment of Skin Malignancies. J. M. MARTIN, M. D., and C. L. MARTIN, M. D., Southern M. J. 17:391-397, June, 1924.

THE authors' transformers are of the modern interrupterless type, three different designs, all operated from the commercial mains at 220 volts. Regular treatment tube stands are being used and are supplied with four cones, three round and one square, the diameters of their openings being $\frac{3}{4}$, $1\frac{1}{2}$, 2 and $2\frac{5}{8}$ inches respectively. When these are fitted to the treatment stands the targets of the Coolidge tubes may be brought to within ten inches of the lower ends of the cones which rest firmly upon the skin of the patient to prevent static, to keep the patient from moving and to direct the beam of rays to the lesion and insure a standard distance between the target and the surface of the tissues. A stabilizer is not necessary where large commercial generating plants are available but is a great comfort when accurate dosage is required. An alarm clock is used to measure the time and a complete record is kept of every treatment given. The tables are wooden heavily upholstered for comfort, the tube and cone are so adjusted that the beam of x-rays falls as nearly as possible directly upon

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the lesion and at right angles to its surface. The patient is instructed to neither uncover nor raise the hands.

In superficial skin malignancies a 5 inch spark gap, 5 ma., target skin distance of 10 inches, 0.5 mm. Al is used for from five to ten minutes. The five minute dose produces one erythema dose on the skin according to the Withbee and Remer method. Exposure is made every other day until four to six treatments have been given directly over the lesion. At the end of six days when the fourth treatment is given, the exposed area should begin to show tissue changes such as redness, heat, actual shrinking and sometimes softening of the indurated mass. If the growth is a small thin one, treatment is then discontinued but if a thick one then exposures should be continued until eight to ten have been given. At first there may be relief from soreness and pain, then follows a period during which there will be a thin yellow discharge with a tendency toward crust formation and with pain accompanying it. Crusts will form and gradually drop off, growing smaller and smaller and leaving the affected area smooth and the tissues soft and practically free from cicatrices or noticeable atrophy. At the end of ten to fourteen days during which the exposures are being given the effect of the treatment will be sufficiently manifest to warrant what the final result is to be. If it is thought the growth has been destroyed the patient may be allowed to go home with reasonable assurance that when healing is complete the lesion will have disappeared.

If there is a probability of metastasis in nearby glands exposures of a higher voltage are used with the following factors: 8 inch spark gap, 5 ma., 10 minutes at 10 inch target distance, 4 mm. Al. This gives the skin 40/45 of an erythema dose which may be repeated every three weeks with safety if no marked degree of reaction has followed a previous exposure. The authors have more recently used a filter of 0.5 mm. Cu with 140 peak kv., 6 ma., at a 12 inch target skin distance, 60 minute exposures, and have obtained good results thereby.

In treating superficial skin lesions one should remember that the larger the area exposed the smaller the dose required.

The practice formerly followed of first treating the skin lesion surgically and treating postoperatively by x-ray does not give as good cosmetic results as raying alone does and in other respects is no better. The authors oppose the removal of even

a section for microscopical examination and do not allow this to be done in any case. The knife too often produces metastases, and the cautery may produce ugly scar tissue. Electrocoagulation may be used for the rapid destruction of large superficial lesions and there is little to fear from metastases or secondary hemorrhage providing the tissues are not completely charred. Postoperative x-ray treatment should immediately follow and it will lessen the chances of recurrence and decrease the size of the resulting scar.

Each patient is supplied with ten cards to take home with him which he is to mail back at a definite time stamped upon the card after answering the questions as to recurrence, metastases, treatment being followed, weight, general health and any other point of interest. No name appears on the card, simply the case number. Thus a report is obtained every six months for five years.

Radium Treatment of Carcinoma of the Antrum. FREDERICK M. JOHNSON, M. B., Surg. Gynec. Obst. 38: 819-825, June, 1924.

RADICAL surgical measures do not yield satisfactory results. Bloodgood has made the statement that in all his records of thirty years he cannot find one instance of proven cancer of the antrum cured by excision of the upper jaw.

The author's experiences in the use of heat alone have not been sufficiently satisfactory to consider it a method of choice. However, in radium therapy a distinct advance seems to have been made in the last few years in the treatment of these lesions.

Diagnosis is very difficult because of the hidden location of the disease and the fact that definite symptoms are not apparent until the disease is well established. However, antral cancer may and often does produce symptoms and signs referable to the nose, orbit and teeth. Often there is a history of nasal obstruction, purulent and later blood stained discharge, intranasal operations, recurring polyps, incomplete healing of tooth sockets after extraction, persistent pain or burning over the cheek (irritation of fifth nerve), later referred to the teeth or forehead.

At the Memorial Hospital, New York City, the treatment, in general, consists of preoperative, operative and postoperative radium treatment. Conservative surgery combined with radium has been found to yield better results than radical surgery.

The preoperative treatment: The antrum and accessory sinuses are

subjected to a maximum pack treatment, 6 cm. distance. The pack consists of a flat brass box with walls 2 mm. thick, an area equal to 77 sq. mm., and it contains silver capsules of glass emanation tubes with a dosage equalling about 9,000 mc. hrs. The lymphatic glands of the neck are exposed in the same way. If the available emanation is limited x-rays may be used in this preoperative treatment.

Operative treatment: Successful application of radium depends upon an adequate exposure of the area. As a rule, an oral approach is best, but if conditions demand it the eye should be removed and the floor of the orbit opened. Before the tumor area is touched a 10 cm. skin incision is made under local anesthesia along the anterior border of the sternocleidomastoid muscle. The lymph bearing tissue close to the internal jugular vein and the posterior submaxillary space is exposed and examined and if there is any suggestion of metastasis a complete neck dissection is performed at once; if not, unfiltered emanation tubes are inserted and the external carotid, lingual and facial arteries are ligated. The author believes that this ligation is wise because it prevents serious hemorrhage and the starving of the tumor is helpful to the action of the radium. In 400 cases the author has had no bad results from ligation. The antral operation is performed at the same sitting or else postponed a few days, depending upon the patient's condition. It is essentially an operation to expose the growth for radiation and the method of approach will vary with the case, i. e., whether there are intraorbital symptoms or a lower location. Severe cases may require an opening through both the alveolus and orbit. Radium is applied by tying unfiltered emanation tubes in the end of an ordinary rubber finger cot and packing it centrally or toward any wall, depending upon the needs of the case. About 35 to 40 mc. are used for 48 to 60 hours. An intense caustic effect is produced but this is necessary and in six to ten weeks slough and destroyed bone are cast off. The main reliance in operative methods is upon radium and not upon the cautery or the curet.

Postoperative treatment: Frequent irrigations are necessary. Loose pieces of necrotic tissue and bone should be gently removed. If a large sequestrum forms it may be many weeks before it sloughs off and there will be considerable pain and suppurative discharge. Excessive granulation tissue may occur and one

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must distinguish between this and a recurrence. After these effects have subsided one must be on the watch for possible neoplastic nodules that have not completely regressed and if these seem to be enlarging, emanation tubes or filtered needles are applied, but one should be cautious as regression may continue even after the outward effects of the radium have disappeared.

The author's cases taken as a group were far advanced, one or more walls of the antrum being destroyed in all but four of the 24 cases reported. Of these 24 cases, 4 (far advanced), were unimproved; 4 are progressing satisfactorily since operative treatment; 8 were improved locally and generally although never at any time free from malignant growth. Duration of palliation extended in one case for a period of four years; 2 cases are clinically cured for two years, 1 for one and one-half years and 3 were free of disease for 1, 2 and 3 years; 1 free for six years.

The Status of Radiation Therapy in Cancer of the Tongue and of the Fauces. H. K. PANCOAST, M. D., Am. J. Roentgenol. 11:458-460, May, 1924.

SURGERY alone in cancer of the tongue and tonsil cannot be regarded as a very great success except in very early cases and in the hands of a few men. Radiation and electrodesiccation seem better adapted for the purpose. Radium because of its peculiar adaptability to different methods of application is the most important therapeutic agent, electrocoagulation is often a necessary adjunct to radium and in case of cervical metastasis the roentgen rays are necessary also.

Prognosis is better in cases of the tip of the tongue than elsewhere and except in cases of metastasis a complete wide surgical removal yields as good results in everything except tissue conservation.

Usually however, the lesion is on the side of the tongue and prognosis depends upon the extent and duration of growth and the thoroughness of treatment. Except in early cases without metastasis, radiation and electrodesiccation give better results than surgery. Although some workers do not, Dr. Pancoast does believe that implantation by needles or bare emanation tubes is required in addition to surface treatment, but he recognizes the fact that trauma so produced may predispose to metastasis.

Cancer of the tongue back of the anterior faucial pillar is a far more serious problem and the nearer it

approaches the epiglottis the more hopeless it is.

Electrodesiccation may take the place of surface radiation or it may precede or immediately follow implantation of radium or it may be done at or near the height of reaction. The combined effect of heat and radiation is likely to yield the best results. In some cases severe radium reaction seems to promote metastases and the author believes that early electrodesiccation may tend to prevent this happening. There is also the danger in electrodesiccation of a severe secondary hemorrhage at the time when sloughing begins. Ligation, even were it feasible, would not always prevent this.

In possible or evident metastatic cervical lymphadenoma, treatment is equally as important as in the primary lesions. Palpable neck glands should be treated by roentgen or gamma rays and if they do not then respond, a thorough block dissection should be done, or else implantation of radium needles or bare emanation tubes. Secondary treatment is important to the progress of the case, mouth cleanliness (extraction of teeth if necessary), and feeding are the most important factors of after treatment.

Diathermy and Reflec'd Light and Heat in Pulmonary Conditions. Editorial, Am. J. Electroth. & Radiol. 42:188, May, 1924.

REFLECTED radiant light and heat from incandescent sources provide an almost unfailing treatment for colds and the bronchial troubles usually associated with them, if used with the proper technique. Applications should be made for not less than one hour and in severe cases there should be only one or two hours between treatments. If there is laryngeal or pulmonary involvement the light may be used at intervals between the head and chest. In early cases of sinus and nasal affections two treatments of radiant light may suffice but in bronchitis it is better and more satisfactory to employ diathermy, using electrodes 10 to 12 inches square placed anteriorly and posteriorly over the chest. If there is laryngeal involvement then another electrode is connected with the anterior metal electrode. These treatments should be given for an hour daily and usually two or three of them will terminate the trouble.

In chronic cases of bronchitis four to six treatments will be needed and very deep seated cases, the kind that recur each year, will require treatment on alternate days for several

weeks. The same is true of chronic asthma cases.

The results are most striking in pleurisy. The current is then administered transversely from over the site of the pleuritic pain to an area directly opposite, employing electrodes of equal size. If taken early an attack can be aborted.

An impending pneumonia may be arrested if taken in the first stage of chill with severe pain. Diathermy should be used twice every twenty-four hours, applied as in pleurisy only over a larger area. In early treatment the treatment may be given as in bronchitis for one full hour employing heat at skin toleration, naturally, the electrode will be placed transversely across the chest as the lesion usually originates near the base of the lung and on one side. The normal lung is never harmed by passing the current through it. In pneumonia of the bronchial type the electrodes placed anteroposteriorly will give very prompt relief beginning with the first treatment. In croupous pneumonia, involving one or more lobes, the current may be passed in the early stages directly across the infected portion. If the cardia is showing signs of weakening, administration should be transversely done through the posterior cardiac space and for periods not longer than twenty minutes to half an hour, treating for longer periods directly across the cardia as the patient's condition improves. Diathermy will be less effective in cases in which there is a leucopenia and an abnormally low number of erythrocytes. In asthenic cases recovery is almost certain if administration is done with proper reference to the conditions present, even in advanced cases.

When there is severe pain and dyspnea with a tendency to cardiac failure persistent applications of reflected incandescent light and heat will relieve the pain and by reflexly stimulating the deep centers will so increase the cardiac action as to carry a patient over the crisis when digitalis or caffeine might fail.

The treatment induces active hyperemia, raises the local resistance in parts that are involved in an infectious process whether catarrhal or pneumonic, and thus carries away the invading bacteria by increasing phagocytic activity.

The Diagnosis of Primary Intra-thoracic Neoplasms. GEO F. THOMAS M. D. and H. L. FARMER, M. D. Am. J. Roentgenol. 11:391-405, May, 1924.

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A SURVEY of the literature would not induce a casual reader to place much reliance upon roentgenographic aid in the diagnosis of lung tumors but a more careful study of the data leads to a different conclusion.

The object of this paper is to show that failure to resort early and routinely to a complete roentgen ray examination of the chest will result in a failure to detect and diagnose a large percentage of intrathoracic neoplasms.

It is rarely that lung tumors are diagnosed by clinical means and even in this day when roentgen aid is available most cases are not discovered until postmortem. This should not be so, for physical conditions could hardly be more ideal than in the thorax for either clinical or roentgen examination. The author believes the fault lies not so much in an inadequacy of available diagnostic methods as in a failure to use them and to properly evaluate the data thereby obtained. The roentgenogram of lung cases is essentially accurate but a hasty glance at the plate often seems to confirm what is a faulty diagnosis.

For proper interpretation and for synthesis of physical and roentgen findings a knowledge of the gross pathological characteristics of primary lung carcinoma is fundamental and the following is quoted from Moise as a summary of this necessary knowledge: "The gross anatomic appearance of lung tumors is very variable and there are no well defined gross types. A nodular form, an infiltrating form, and a miliary carcinosis have been described and these descriptive terms are frequently used in classification, although they are obviously applicable rather to stages in the growth of a tumor than to distinct types of a tumor. The nodular form includes rare cases of a single nodule or a few small nodules in the pulmonary parenchyma, or localized papillary tumors arising in the walls of tuberculous or bronchiectatic cavities and are only discovered incidentally at necropsy. The infiltrating form is the usual finding as the majority of cases are seen in an advanced stage when there is extensive invasion or infiltration of the lung. In these tumors the most significant gross finding is that the tumor is confined to or is much more extensive in one lung while secondary tumors are frequently distributed widely throughout both lungs. In advanced stages of the primary tumors, the distribution of the cancerous invasion within the lung is quite uniform, the bronchi

and blood vessels are encircled by bands of tumor, which become more and more conspicuous as the hilum is approached. These peribronchial tumor masses may compress the larger bronchi with resulting total or partial occlusion leading to atelectasis and bronchiectasis. A large mass of carcinomatous tracheo-bronchial lymph nodes is frequently found filling the angle between the main bronchi. The hilac nodes on the opposite side are not infrequently involved, but the opposite lung itself is relatively free from tumor nodules. The cases described as miliary carcinosis are said to resemble miliary tuberculosis except that the nodules are somewhat larger, more translucent and whiter in color, and are situated only along the course of the lymphatic channels. This finding is apparently indicative of an early widespread lymphatic invasion of the lung."

Most pathologists classify carcinoma of the lung under three heads: the first type arises from the lining of the epithelium of the bronchi; the second from the mucous glands and the third from the alveolar epithelium. The last form is now considered rare and it is questioned by many whether it ever occurs.

The arteries, veins and lymphatics are the obvious paths of metastasis and a knowledge of their anatomy is of course necessary for roentgen interpretation. The more important sites of metastasis are the regional lymph nodes, liver, pleura, kidney, lung, brain and bones.

In Hodgkin's disease, lymphosarcoma and growths from the mediastinum or hilar nodes there may be infiltrating of the surrounding lung tissue simulating the appearance of a bronchial carcinoma.

Most cases of pulmonary cancer will present symptoms referable to the chest. Cough and dyspnea are frequent. Bloody sputum is suggestive. Most cases have pain referred to the shoulder or arm or side, occasionally referred to the abdomen. Weakness is early noted and is out of proportion to other physical signs. There may or may not be loss of weight, sometimes there is even a gain in weight. Progressive dyspnea or persistent pain in the region of the chest in any patient past middle life indicates a possibility of lung tumor. Physical signs vary with size, location, amount of involvement of air passages with secondary changes. Sometimes the roentgen rays discover a tumor several centimeters in diameter which physical signs have not betrayed.

Differentiation between benign and malignant neoplasms may sometimes be indicated by clinical progress, and a study of the method of growth, by repeated roentgen examination of the periphery of the tumor from different angles. The law of probabilities favors malignancies. Rapid growth, an indistinct border, radiating projections from the tumor mass, multiple nodules, evidence of metastasis to ribs or vertebrae and pleural effusion would indicate malignancy. Lack of growth and the maintenance of a sharply defined border would be roentgen evidence in favor of nonmalignancy. Erosion of the ribs or vertebrae by pressure in benign tumors would be sharply limited to the contour of the tumor shadow itself. A multitude of details of differentiation are discussed throughout the next page.

Stereoscopic views should always be made. The author has not found artificial pneumothorax of any aid.

Eventration of the Diaphragm.
HENRY J. WALTON, M. D., Am. J. Roentgenol. 11:420-426, May, 1924.

THE roentgen signs and observations to be looked for in eventration of the diaphragm are a high position of the diaphragmatic arch; regular contour of the arched line; excursion (usually present but limited on the affected side); paradoxical movements on the affected side (inspiratory ascent and expiratory descent, also seen in hernia); mediastinal excursion from the affected side toward the sound side during inspiration; displacement of the heart to the right; distinguishing line between the diaphragm and viscera below; pneumoperitoneum.

The typical curved line of the dome of the diaphragm, lying high in the thoracic cavity, is not sufficient for diagnosis as the same thing is sometimes seen in hernia though in hernia the contour of the arch is usually irregular and somewhat nodular.

The only pathognomonic roentgen sign of eventration of the diaphragm is a distinguishable separation of the arched line of the dome of the diaphragm from the viscera below. This is best accomplished by introducing air (only small amount needed), into the peritoneal cavity, examining the patient in either the upright or the lateral position. In eventration the abdominal viscera will drop away from the diaphragm, while in hernia the dome of the diaphragm cannot be isolated from the hernia above. In this procedure care must be taken not to overdistend the

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abdomen, as in case of hernia strangulation may result. Also any fluid in the abdominal cavity must be withdrawn before the introduction of air.

Quite a number of case reports are given in detail and a bibliography of 100 or more references is appended.

Protective Device for Fluoroscopy.

NANDOR RATKOCZI, M. D., Klinische Wehnschr. 10: No. 3

THE harmful effects of the direct roentgen rays are well known but that the diffuse and tiny stray rays which are encountered in fluoroscopic work can lead to a general systemic effect very injurious to the one encountering them is not so widely known. The author feels certain of this fact from his own experiences and from proof he has garnered from conversations with other roentgenologists. The symptoms are a tendency to tire quickly, general weakness, inordinate desire for sleep, oftentimes an excruciating headache, fainting, rarely nausea, irritability, trembling of the knees and legs. These effects are not due to the bad air and strenuous work but are largely the effects of the rays.

The author's own experience led him to devise some means of protection when using the fluoroscope. As only a thick leaden wall offers a sufficient protection he made what he calls a "personal" protective wall, an ingeniously contrived box-like screen behind which the operator may stand or sit. There are places for the arms to reach out to manipulate the patient and the screen is easily movable as one sits at work by simply directing it with the foot. He describes it in detail, giving all measurements, etc.

The author says that after the installation of this device in his laboratory the harmful effects of the rays gradually ceased to trouble either him or his assistants and that he would by no means be without this piece of apparatus.

Biophysical Research in Radiation Energy. A. J. PACINI, M. D., Jour. Am. Asso. Medico-Physical Research. 1:199-200, April, 1924.

THE practical points brought out are that the air-cooled lamp is biologic, a metabolic stimulant, is a tissue regenerator as opposed to the water-cooled lamp which is a metabolic depressor, an abiotic energy particularly useful in bactericidal work, hence, these lamps are called the biological air-cooled and the bactericidal water-cooled lamp. Exposure of the body to the air-cooled lamp induces an increase

in the amount of calcium and of phosphorus in the blood. Whenever these elements are needed as in any of the bone tissues, rickets, scurvy or fracture, they may be accelerated by use of the air-cooled, mercury quartz lamp.

Duodenal Ulcer. Direct Visualization by Means of the Roentgen Ray.

VICTOR KNAPP, M. D., Am. J. Roentgenol. 82:1585-1586, May 17, 1924.

WORKERS abroad have given ample recognition to the significance of a niche on the lesser curvature of the first portion of the duodenum, with an incisura opposite this point on the greater curvature of the first portion of the duodenum. This niche is absolute proof of the presence of duodenal ulcer. However deformity of the duodenum other than this mentioned is not sufficient evidence upon which to base a diagnosis of ulcer. A case report is submitted together with several references to the literature.

Physical Treatments in Gastro-Intestinal Disorders. ANTHONY BASLER, M. D., F. A. C. P., Am. J. Electroth. & Radiol. 42:169-173, May, 1924.

POOR diagnostic work is the bane of substantial medical service and progress. It takes time, patience, proper use of apparatus and "that sixth sense, interpretive and understanding art of the student-clinician to get anything like accuracy in diagnosis." Even with the best skill available only 75 per cent of diagnoses are right. There are those whose interest is so centered in their particular specialty that their desires in diagnosis are quite secondary to their interest in their specialty, which accounts for some of these mistakes.

The author formerly employed the faradic currents but he now uses the sinusoidal currents. He doubts whether the modality raises the tone of the hollow viscera or is of benefit in dilatation excepting for the secondary beneficial effects on the abdominal wall muscles; he would use this form of treatment but he would rely mainly upon diet, exercise and medical means.

In painful gall-bladder conditions, however, he no longer doubts the relief that diathermy affords, although operation is usually the treatment called for. The pain from abdominal neuroses and painful adhesions has been thus relieved. Several cases of angina pectoris due to sclerosis of the coronary arteries have seemed improved after direct applications. Painful spinal condi-

tions following upon infectious disease or accompanying digestive disorders have been relieved where ganglionitis of the posterior spinal root exists.

The X-Ray Examination of the Alimentary Tract. JAS. R. RIDDELL, F. R. F. P. S. G., Glasgow Med. J. 101:140-147, March, 1924.

THE author uses three ounces of barium sulphate, one-half dram of gum acacia made up to ten ounces with water and sweetened for the opaque meal. He gives with this a little bread and butter and a glass of milk. An aperient should be given 48 (not 24) hours before the examination. Usual meals are allowed the day before but on the morning of the examination only a cup of tea and a biscuit, two or three hours beforehand, are allowed.

The gullet should always be examined. The author relates a case of a gastro-enterostomy being done to relieve vomiting, later an x-ray examination was made and the trouble was found to be cardiospasm. The patient should stand in the oblique position. The usual time for a bolus to pass from the mouth to the stomach varies with the individual but usually occupies about five seconds; it is momentarily held up about the center of the gullet and again as it enters the diaphragm. Common abnormalities are malignant diseases, cardiospasm and diverticulum. Rigidity and irregularity of outline of the affected area with some dilatation are suggestive of malignancy. In cardiospasm the obstruction will be at the end of the gullet, the shadow narrowing off smoothly, usually great dilatation present and the rounded under surface of the pouch together with its manner of filling are destructive.

After this observation has been made the manner of passing of the opaque meal is noted—normally it passes slowly, filling the stomach from the bottom, the stomach assuming the form of a vertical tube the lower pole being about an inch or more below the umbilicus, the upper pole containing air and appearing as a rounded dome close under the left diaphragm. A normal stomach will become wider as food is added but it will retain the tubular form. The air and food contents will meet in a horizontal line at the level of the entrance of the gullet. The umbilicus is roughly, at the level of a line joining the tops of the crests of the ilea. Within normal limits the appearance of the stomach varies greatly. The lower pole may be an inch above the umbilicus in the stout pa-

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Shape, tone, mobility, peristalsis, rate of emptying and contour are the points to be noted in examining the stomach. The shape may be cow-horn or fish hook. The cow-horn shape is rare and in this shape the stomach is small and lies obliquely across the abdomen, the greater curvature forming only a gentle curve, the most dependent part above the umbilicus. In the fish hook type the sides are vertical, the lower pole well below the umbilicus and the pylorus opens upwards into the duodenum.

From the standpoint of tone stomachs are divided into four groups, hypertonic, normal, hypotonic and atonic. The hypertonic is usually associated with excessive peristalsis and may be associated with active duodenal ulcer and may produce the cow-horn shaped type.

The hypotonic type has insufficient tone to hold the meal in tubular form so that the upper two-thirds of the walls tend to approximate while the lower pole tends to broaden and to sag. With greater loss of tone the walls of the body of the stomach come together and the meal lies then in the lower pole spread out like a saucer. The hypotonic is usually seen in cases of chronic gastric ulcer and the atonic in old standing pyloric stenosis. The mobility is tested by gentle pressure with the hand and normally the stomach is freely movable except at the upper pole which is just out of reach under the costal margin. The rate of emptying will vary with the nature of the meal and normally varies within wide limits. Two to three and one-half hours may be regarded as normal for the meal described here.

Peristalsis begins just after the ingestion of a meal—a wave showing as a slight indentation on the greater curvature, and to a smaller degree on the lesser. Seemingly it begins about the juncture of the middle and upper thirds of the organ and passes slowly and steadily downwards becoming gradually more marked until as it approaches the pylorus it cuts deeply into the stomach shadow and reduces the lumen to a narrow band. Two or three such waves are seen at one time, a wave reaching the pylorus once in twenty seconds.

Peristalsis may be excessive, it is seen in commencing pyloric stenosis and in duodenal ulcer, or it may be lessened in the hypotonic stomach, or absent, as is usual, in complete atony.

The contour of the stomach yields valuable information. There may be a definite loss of shadow over a greater or less area. This shadow defect may take the form of a narrow deep cut with smooth regular edges,

the result of spasm, called incisura, and is strongly suggestive of ulcer on the opposite wall of the stomach.

Next the pylorus and duodenum are examined. A small pencil of rays is used to light up the pyloric area only. The peristaltic wave should bulge out the stomach wall on both sides of the pylorus evenly and regularly as it approaches and a careful watch should be kept for any small persistent irregularity near or at the pyloric ring, which might indicate ulcer or tumor.

The duodenum presents difficulties. Cinematographic pictures of the passage of the opaque meal are instructive but they are not practicable. The author uses what he calls a simple apparatus which records in quick succession on a plate a number of pictures of this region. The pictures can be taken at intervals of a few seconds and the changes produced by the passage of the wave at any point can be seen. In a group of six to eighteen pictures there may be two or three representing the same point in the cycle and if there is an irregularity in one and not in another it cannot be ascribed to organic change but to spasm which massage will usually remove, though in some cases an antispasmodic must be given and allowed time to act.

The examination so far will have taken half an hour or more and any obstruction in the upper part of the small bowel should be apparent. Another examination should be made three to four hours after giving the meal to determine how far the stomach has emptied but the author does not think it a matter of great importance to determine just how long it takes the stomach to empty.

The ileocecal region is next examined. The cecum normally lies in the right iliac fossa, its lower extremity near the brim of the true pelvis and the ileum usually passes upwards and outwards from within the pelvis to enter it. These parts should be freely movable by gentle manipulation and in doing so the appendix often comes into view and if it does it should be freely movable also. One should look for the appendix, fixation or ptosis of the cecum and for fixation, dilatation or delayed evacuation of the terminal ileum. Anything over fifteen hours is regarded as delay, but this must be considered in relationship to the emptying time of the stomach: a twelve hour residue with a rapidly emptying stomach and a normal small bowel is a matter of suspicion but would not be such if the stomach were atonic and emptied slowly.

For the appendix to fill or to appear segmented is not indicative of disease but if barium remains after it has emptied itself it is probably unhealthy. If it is fixed at any point or shows a kink or pressure or if it causes pain it is probably diseased.

For examining the long bowel either an opaque enema or opaque meal may be used but the enema is better, the same mixture being employed for either. The tonic contraction following the meal may give rise to a misleading appearance. The long tube is not used for the enema as it simply coils up in the ampulla. Too great force should not be used to make the fluid pass a stricture of the colon—a head of two feet is plenty. It usually takes about four minutes for fluid to reach the head of the cecum. The patient may lie either on the face or on the back. The colon is fixed at the splenic flexure and at the rectum and is said to be fixed at the hepatic flexure but the author says he so often finds it ptosed and movable there that he does not believe a small amount of mobility should be regarded as pathological. Irregular shadow defects bulging into the lumen from one side or irregular and narrowing, especially with fixation, are suggestive of disease, but scyballa in the bowel may produce shadow defects and this possibility should be eliminated. A general narrowing with loss of hastration over a considerable extent is suggestive of chronic colitis. Of course the x-ray findings must be considered along with other signs and symptoms.

Some Considerations in the Treatment of Carcinoma of the Esophagus. DOUGLAS QUICK, M. D., Am. J. Roentgenol. 11:383-388, May, 1924.

CARCINOMA of the esophagus is a disease in which one can hope for palliation only. An early gastrostomy offers the major portion of this relief. External radiation, preferably with high voltage roentgen rays, aids in slowing up the rate of tumor growth but so far has not controlled it. Intra-esophageal application of radium, preferably in small repeated doses is indicated to control ulceration and bleeding locally but has little influence on the actual progress of the disease.

Light Treatment of Certain Forms of Surgical Tuberculosis. G. CLAESSEN, Acta Radiologica, 3:15-25, No. 11, 1924.

FOR good results in the light treatment of surgical tuberculosis it is important to choose a suitable

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and effective apparatus as there is a great difference in the working conditions of the lamps procurable.

The author gives the results obtainable by the ambulant use of the quartz light baths in three kinds of surgical tuberculosis, namely, lymphadenitis tuberculosa, abscessus subcutaneous and ulceratio tuberculosa, and spina ventosa. Also the lymphomata were partially treated with roentgen and radium. The results are so favorable as to render a stronger source of light unnecessary in these diseases.

Even though patients with external tuberculosis generally suffer from a universal disease, the local treatment is considered sufficiently successful in cases of tuberculous lymphomata which present clinically the aspect of a local disease. General electric light baths are otherwise recommended.

The author states that he has never seen lupus vulgaris, which occasionally occurs in other countries, in the surroundings of the fistulae originating from tuberculous foci in the bones or in the soft parts, nor have such cases been observed by other physicians of his country.

During treatment small surgical operations are necessary and the radiologist, unless he is surgically trained, needs the cooperation of the surgeon.

The well equipped clinic should have at its disposal both the quartz lamps for more superficial processes and the arc lamps for more deeply seated lesions.

The Roentgen Picture of Fresh Subperiosteal Hemorrhage in Fractures of the Metatarsals. GOESTA RUNSTROEM. *Acta Radiologica*, 3: 42-44, No. 11, 1924.

THIN spindle shaped deposits may be found in metatarsal fractures in the first days following fracture. These deposits do not occur in fractures with a dislocation. The author believes that they are caused by subperiosteal hematomata in subperiosteal fractures and that owing to the hematoma collecting underneath an intact periosteum it becomes so dense and circumscribed as to become visible in the roentgenogram.

On Fractures of the Proximal Portion of the Radius and Their Causes. G. ODELBORG-JOHNSON. *Acta Radiologica* 3:45-51, No. 11, 1924.

THE basis of this study consisted of two cases of extra-capsular transverse fracture of the head of the radius, 35 cases of "chisel fractures" of the head of the radius, either with or without a T-shaped fracture of the

neck, and also 6 cases of a simple fracture of the neck of the radius in persons with an open epiphyseal line.

Concerning the way in which the chisel fractures and the fractures of the radial neck in children are produced the writer agrees with the views of P. Bruns and others. According to him such fractures are produced by a blow in the longitudinal direction of the radius in pronation, the capitellum pressing down the anteriorly directed rim of the articular fossa of the radius.

However, the writer shows that this course of events is inconceivable without a posterior subluxation of the radial head taking place simultaneously.

A Case of Myositis Ossificans. AXEL WESTMAN. *Acta Radiologica*, 3: 54-58, No. 11, 1924.

THE author describes a case of myositis ossificans of a male child aged two and one-half years. After a period of development of about one year the process had resulted in considerable ossification of the muscles of the neck, sides of the thorax and of the upper extremities. At the test excision and the pathologico-anatomical examination of the changes in the right upper arm it was found that a long area of ossification which had been seen in the roentgenogram was lying in the internal intermuscular septum without the surrounding muscles exhibiting any changes. There were no signs of previous inflammation.

Medico-Radiological-Surgical Studies of the Duodenum. By PIERRE DUVAL, JEAN-CHARLES ROUX and HENRI BECLERE. Octavo, 269, pp., 127 illus. Paper. 1924. Masson & Cie, 120 Boulevard Saint-Germain, Paris, e.

AS a glance at the authors' names shows, the book is the result of collaboration by clinician, surgeon and radiologist. The teachings of the Therapeutic and Surgical Clinic of the Faculty of Medicine, Paris, and the relatively new points upon the pathology of the duodenum are all interwoven with the experiences and observations of these three eminent workers, making a work of value to clinician, surgeon and radiologist alike.

The six chapters discuss the following subjects: (1). The duodenum in biliary lithiasis modifications in form, caliber and location; biliary periduodenitis. (2). Essential stenotic periduodenitis. (3). Chronic compression of the third portion of the duodenum by the mesenteric

pedicle. (4) Technique of the duodenal jejunostomy. (5). Radiological signs of ulcer of the bulbus duodeni. (6) Intoxication in duodenal retention.

The Dyspeptic Condition. By LEON MEUNIER, M. D. Octavo, 126 pp. Illustrated. (Practical Surgery and Medicine Set.) Masson and Cie, Paris 1923. Price 8 francs.

DYSPEPSIA is a Chinese puzzle to all doctors. This book considers this question in an absolutely new light which gives a clue to go by in this pathological maze. The author dispenses with all classical data and shows that the symptoms of pain in the stomach are all subordinate to (1) aerogastritis, (2) prolonged secretion of the stomach, not hypersecretion, which is quite different. These painful symptoms determine the dyspeptic condition which is not a morbid entity but a painful syndrome without any nosologic specificity which includes almost the totality of the gastric, duodenal and hepatic pathology. The author tells how to make an etiologic diagnosis so as to prescribe rational treatment, be it medical or surgical.

Roentgenotherapy of Carcinoma of the Breast. HERMANN WINTZ, M. D., Ph. D. Octavo, 52 pp. text & 80 illus. Cloth. 1924. Published by George Thieme, Leipzig, Germany. Price \$6.50.

DR. WINTZ states that this book is not written with any idea of entering into the controversy as to whether primary mammary carcinoma should preferably be operated or treated by roentgen rays. His point is that if one is to use roentgenotherapy his apparatus and technique should be of the very best and that it is one's duty to study the question thoroughly before he decides his course. The method set forth in this book is the one which Dr. Wintz, after much study and experience, has adjudged to be the best that roentgenotherapy affords.

Part I takes up the physical basis of the roentgenotherapy of mammary carcinoma and discusses it under (1) the biological necessity of bringing the carcinoma dose to the whole cancer field; (2) scattering and secondary rays focus skin-distance and size of field; (3) quantity of deep dose in surface tissues; (4) importance of filtration and the focus skin-distance in surface tissues; (5) distribution of x-ray intensity in the lungs; (6) lateral distribution; (7) influence of secondary rays on the skin dose; (8) additional dosage; (9) dosimetry.

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Part II deals with technique.

Part III deals with castration dose.

Part IV deals with disadvantages in roentgenotherapy, namely, induration of lung tissue, skin and blood effects and toxemia.

Part V deals with fore and after care of patient.

Roentgenotherapy of Tuberculosis of the Lungs and of the Larynx. By

A. BACHMEISTER, M. D., and L. RICKMANN, M. D. Octavo, 95 pp. 60 illus., 17 tables. Paper. 1924. Published by George Thieme, Leipzig, Germany. Price, \$1.90 unbound, \$2.60 bound.

THIS interesting and practical German book is dedicated to Dr. L. Aschoff, Director of the Pathological

Institute of Freiburg, and to Dr. O. De La Camp, Director of the Medical Clinic, Freiburg.

The authors began their work in the year 1913 in the Medical Clinic at Freiburg where already a great deal of preliminary study had been made of this method of treatment and where there was abundant opportunity for observation and practice.

The section of tuberculosis of the lungs is outlined as follows: I. *Foundations of Therapy.* This takes up the subjects of the general action of the roentgen rays on the human body, their action on the tubercle bacillus and on tuberculous lesions.

II. *Roentgen Treatment of Pulmonary Tuberculosis.* The experi-

mental basis, the use of the x-rays in human tuberculosis, the place of the qualitative dose and indications for treatment are discussed.

III. *The Present Practical Results Achieved.* This section reviews the literature to date and gives case reports on various types of tuberculosis.

IV. *Technique for Treatment of Pulmonary Tuberculosis.*

V. *Underlying Principles of Treatment.* Here the authors discuss general treatment (other than x-ray), roentgen treatment and surgical treatment.

VI. *Summary of End-Results.*

The second part of the book takes up the treatment of laryngeal tuberculosis in the same general manner.



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